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SURGICAL CLINICS OF CHICAGO

Volume 2

Number 3

CLINIC OF DR ALBERT J OCHSNER

AUGUSTANA HOSPITAL

RENAL CALCULUS AND GALL-STONES REMOVAL THROUGH RIGHT LUMBAR INCISION; DIETETIC TREATMENT OF RENAL CALCULI

History—The patient, a married woman of seventy six years, was admitted to the hospital September 10, 1917, because of an attack of pain in the right side of the back and flanks.

Her father died at eighty-one of apoplexy, the family history is otherwise negative. She had measles when a child. Has always been healthy. Menstruation began at sixteen. She had the menopause at fifty two, with no complications. She has been married fifty years. She has had eight children, six of whom are living. She had no miscarriages.

Her appetite is good and she sleeps fairly well. Bowels are constipated. She drinks three cups of coffee a day.

Twenty three years ago she began to have attacks of pain in the right lumbar region. In the past year she has had several attacks. These attacks begin suddenly, most frequently at night, with agonizing pain in the right lower abdomen, radiating to the hip and right leg. She has to have morphin several times in a day to relieve the pain during the attacks. She has never noticed blood in the urine. Since the last attack in July she has not been free from pain, which has the character of a constant dull ache. She does not vomit during the attacks. Six years ago she had an attack of pain in the left side. A doctor took an x-ray and told her that she had a stone in the left kidney. The left side has given her no trouble lately.

At 6 P.M., September 10, 1917, she was taken to the examining room and examined by an intern. Just after the physical ex-

amination she had an attack of severe pain in the right side of the abdomen at a point just below the rib margin in the axillary line.

Physical Examination.—The patient is a well-developed, moderately obese, elderly woman, with good color and clear skin. All the upper teeth are missing, and the few lower teeth that are left are in good condition. Neck, chest, heart, and lungs are negative. There is moderate tenderness without spasm on deep palpation over both flanks in the kidney regions. The uterus is moderately prolapsed. There is a marked cystocele and a moderate rectocele. There are three external hemorrhoids.

COMMENTS

DR. OCHSNER (September 13, 1917). We have an x-ray picture here which shows a shadow about 2 cm. in its greatest diameter and 1½ cm. in its lesser diameter. You notice that it is located just beneath the margin of the last rib on the right side, showing that if it represents a renal calculus, said calculus must be located in the upper end of the pelvis of the kidney. It is somewhat irregular in shape. You would consequently conclude that with a stone of this size and with this form we would probably find a stone with the surface composed of phosphatic salts, no matter what the center of the stone might be. The character of the pain is exactly in keeping with the history. It is a dull pain, which is not the pain of a stone that is loose in the pelvis. The fact that there has never been blood in the urine would also confirm this. It is the small stone that gives rise to the severe pain, especially when the patient is shaken up from riding in a

----- Then you will
This

The history of a stone in the left kidney with severe pain would
----- "then you will have

the ureter. That is undoubtedly what happened to the stone that was recognized by means of the x-ray some years ago in this case.

The stone in the right kidney at this time must be irregular in shape and held in one of the calices of the kidney and kept there distinctly by its form, so that it can never get into the ureter. Consequently, the ureter cannot be dilated to the extent of permitting it to pass.

If one operated for the removal of every stone that one is able to demonstrate one would have to operate at least ten times in order to relieve the one that requires the operation. Nine out of every ten will recover spontaneously and, consequently, if one is in the habit of operating immediately on making a diagnosis, one would operate nine times unnecessarily for every once that you would operate where it was proper to operate. We have hundreds of these cases who have had renal colic—I have not looked up the exact number.

The plan that we follow is to give the patient 2 ounces of glycerin every night for two or three nights in 1 pint of sour lemonade and then give $\frac{1}{2}$ pint of distilled water every hour. In a large majority of these cases the stone will slip out within a week or so. The amount of glycerin that is given is not sufficient to cause poisoning. Then after the stones have passed out, we give the patient a diet and at least $\frac{1}{2}$ gallon of distilled water every day for the rest of his life so that he will not re-form stones. Harrison Quibbs demonstrated the fact that the urine must be of a certain concentration in order that stones may be formed. Now by giving the patient $\frac{1}{2}$ gallon of distilled water every day for the rest of his life the urine will not acquire the concentration that is necessary for the formation of stones. If a patient who has suffered from renal colics for years can be relieved permanently by simply following this simple method why should we operate?

I have under my care at the present moment for another condition a patient who for the last twenty years has had renal colic every three or four months. This patient who is a physician had passed calculi for several years. It would take about three to six months to form a calculus, then it would loosen he would have renal colic, and the calculus would pass. Twenty eight years ago I kept him asleep an entire day off and on with chloroform in order to permit this calculus to pass. He has used dis-



Fig. 154.

tilled water ever since and has had no recurrence. Before that for years he passed one two or three calculi a year. In many cases I have observed a shorter period of time. Another patient who is a friend and not a patient at the present time I have observed for twenty six years. Some of them I have had under observation for twenty years. I have one of these cases under observation who came in with renal colic sixteen years ago. We put him upon the treatment I have just described. He passed his calculus and was free from further trouble for eight years drinking distilled water all the time. Eight years ago he built a new house and was too busy to drink the distilled water. He drank the well water that he drank before he had the first colic and before the summer was over he was brought in again from Wisconsin with renal colic. I put him on the same treatment and he passed a calculus 2 cm in length and about 7 mm in diameter. He went back on his distilled water treatment. He has been free all these years from the presence of calculi. I had another patient who had exactly the same condition and who was free from calculi for a number of years by drinking distilled water. Then he went back to the old waters and had recurrence of the renal colic.

This patient is seventy six years of age. We will expose her to just as short an anesthesia as possible by working rapidly. I make an oblique lumbar incision (Fig 154 1) and bring the kidney into view. We have said before that we have also made a diagnosis of gall stones in this case and that at her age the gall stones are very likely to be filled with lime and that consequently the x ray gives the shadow of a large gall stone instead of the shadow of a renal stone. I made a diagnosis of cholelithiasis. There is the kidney exposed here. Now if there is a stone in here it will be in the upper pole.

It is not possible to determine the presence of stone in this

Fig 154—Case of gall stones and kidney stone 1 Line of incision which

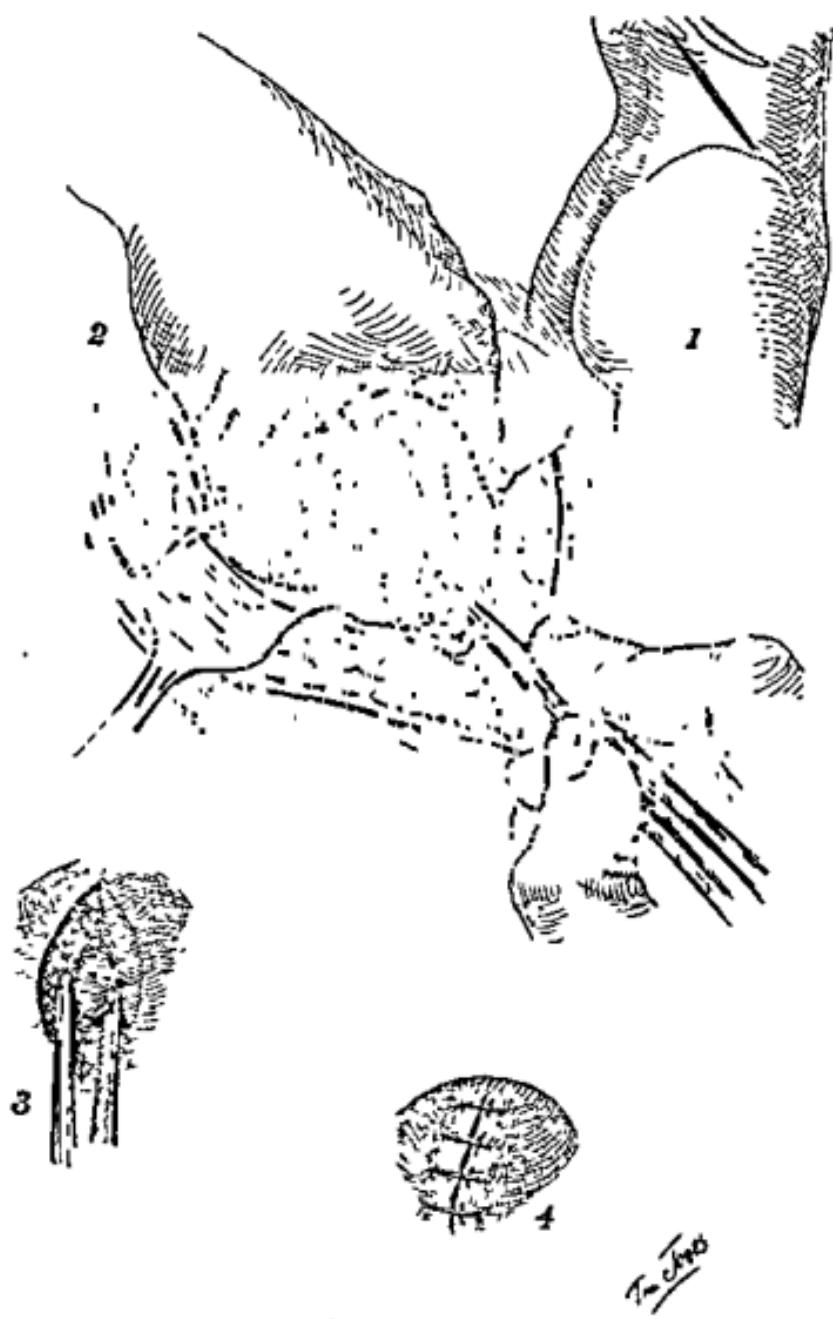


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Fig. 154.—Case of gall stones and kidney stone. 1 Line of incision which provided access both to the gall bladder and kidney. 2 The kidney pulled out and the blunt end of a cambric needle caught in a forceps being pushed into its substance to determine the presence and location of a stone in one of the calices. 3 Removing the stone through a small incision parallel to the long axis of the kidney. 4 Closure of the renal wound with interrupted catgut stitches.

kidney positively by palpation so I hold the kidney between two fingers and puncture the cortex with a straight needle held in a pair of forceps opposite the point at which we expect to find the stone (Fig. 154 2) As the needle strikes the stone I get the characteristic sensation. There is a stone here and it is out of the question to attempt to remove it without incising the kidney substance I place these sutures through the substance of the kidney under the guidance of my finger in the pelvis so as to grasp the entire thickness of the renal parenchyma and so get perfect control of the local blood-supply and then cut directly down on the stone Its removal is not difficult (Fig. 154 3 4) With the exception of a little superficial oozing I have perfect control of the hemorrhage Now I place this gauze directly over the wound in the kidney by this means overcoming the slight superficial oozing

It is quite convenient to remove the gall bladder through this same opening We place a pair of forceps upon the cystic duct just below the point at which the stone can be felt. We are not yet ready to close our incision in the abdominal wall. I have now opened the peritoneal cavity and I can feel a stone which seems to be impacted in the cystic duct. A cystic duct which has been the site of a calculus infection upon removal of the calculus is very apt to develop scar tissue contraction or stricture or become the site of a new stone Therefore as a rule chole-

the cystic duct and either a glass a rubber or a cigarette drain is carried down to the point of the forceps which remains attached to the cystic duct. These forceps will be removed after forty-eight hours the drainage is introduced in order to take care of any bile which may subsequently escape. The drainage tube is left in place for about one week. The gauze packing against the surface of the liver is loosened by gentle traction on the fifth or sixth day after the operation and slowly removed.



Fig. 155—Closure of lumbar wound with drainage to both the renal and gall bladder spaces. The forceps are clamped on the cystic artery and duct.

It is possible that a small amount of urine may escape from the cut surface of the kidney but as the urine is sterile it will do no harm and it is not likely that much will escape in this way. The wound is closed by successive layers of sutures grasping the cut ends of the muscle the deep fascia and the skin the cystic duct drain as you see passing out through the incision in the loin (Fig. 155).

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distal to the first pair and the cystic duct is cut between these two forceps. A pair of forceps on the side of the gall bladder serves very nicely as a retractor by means of which we are able to steady the gall-bladder while freeing it from its attachment to the liver. This gauze is then packed against the raw surface of the liver down to the point of the forceps which remains attached to

the cystic duct, and either a glass, a rubber, or a cigarette drain is carried down to the point of the forceps which remains attached to the cystic duct. These forceps will be removed after forty-eight hours, the drainage is introduced in order to take care of any bile which may subsequently escape. The drainage tube is left in place for about one week. The gauze packing against the surface of the liver is loosened by gentle traction on the fifth or sixth day after the operation and slowly removed.



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The patient will lie on her back, but tilted a little toward the right side, being carefully bolstered up by pillows and pads so as to prevent pressure on the forceps which we have left on the cystic artery and duct, and at the same time encourage drainage by gravity through the wound in the flank.

The gall bladder which I have just removed has been split open by the pathologist and you can plainly see the changes in

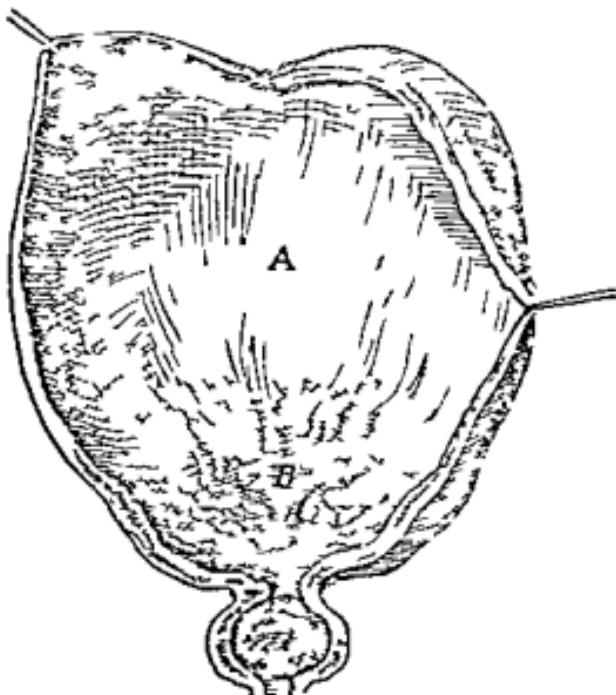


Fig. 156.—The gall-bladder removed. It was full of bile-pigment stones and one of them was impacted in the cystic duct as shown. The mucosa in the fundus (A) was comparatively smooth, but at B there was marked injection of blood vessels and edema of the mucosa.

the mucous membrane particularly in the region of the impacted cystic duct stone (Fig. 156)

NOTE—The gall-stone was 1.2 cm. in diameter made up of concentric layers of bile-pigments. The renal stone was a typical "mulberry" stone. These two objects correspond in size to the two shadows on the radiograph of the right upper abdomen. A radiograph taken one week after operation showed no shadows.

CLINIC OF DR ARTHUR DEAN BEVAN

PRESBYTERIAN HOSPITAL

KIDNEY STONE

Summary A patient presenting the typical signs and symptoms of renal calculus—technic of pyelotomy—methods of diagnosis—development of the technic of x-ray examination—relatively slight value of cryoscopy—cystoscopy—ureteral catheterization and the phthalein test of prime importance, treatment—indications for operation—many cases best handled expectantly—nephrolithotomy—the indications—incision in Brödel's line—postoperative hemorrhage—the silent renal calculus

January 4, 1918

THE patient whom I shall show you today is a case in which we have made a clinical diagnosis of renal calculus and an x-ray diagnosis of a stone about $\frac{1}{2}$ inch in diameter, probably in the pelvis of the right kidney. The x-ray shows no evidence of stone in the left kidney. The symptoms have been rather typical and classical.

The patient, a man of thirty-eight, was brought to the hospital suffering from an acute attack of renal colic. He said that this was the fifth attack of the kind that he had had. They were all very similar in character, coming on rather suddenly, with acute very severe pain beginning in the right lumbar region, radiating down toward the bladder and the external genitals. The pain was so severe that he had to assume the recumbent position and it required $\frac{3}{4}$ grain of morphin before the worst of the pain was relieved. The morphin was given in divided doses of $\frac{1}{2}$ grain each at intervals of about one half hour.

The urine showed microscopically red blood cells and the patient stated that on several occasions there had been gross blood in the urine and that he had passed, in some of the attacks, small blood clots. Between the attacks the patient was quite well.

The patient will lie on her back, but tilted a little toward the right side, being carefully bolstered up by pillows and pads so as to prevent pressure on the forceps which we have left on the cystic artery and duct, and at the same time encourage drainage by gravity through the wound in the flank.

The gall-bladder which I have just removed has been split open by the pathologist and you can plainly see the changes in

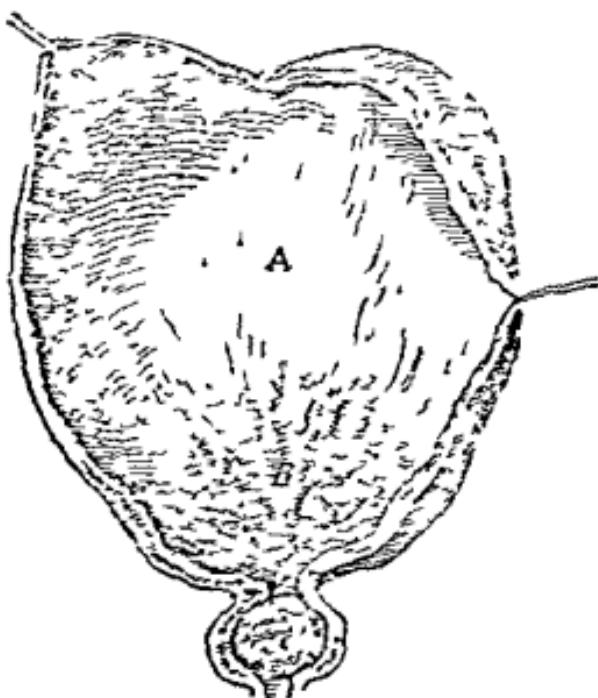


FIG. 155.—The gall-bladder removed. It was full of bil-pigment stones and one of them was impacted in the cystic duct as shown. The mucosa in the fundus (A) was comparatively smooth, but at B there was marked erosion of blood-vessels and edema of the mucosa.

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second layer of the lumbar fascia and expose to view the fatty capsule of the kidney (Fig. 158) I extend my incision forward and divide the external oblique muscle for a short distance Introducing both hands I now stretch gently the edges of the wound enlarging it so as to give me free access to the kidney I am now dividing with blunt dissection the fatty capsule of the



Fig. 158.—Details of the oblique lumbar incision note the muscular and fascial planes opened as the dissection is carried down to the fatty capsule of the kidney.

kidney coming down to the fibrous capsule of the kidney There has been a slight perinephritic process making it a little more difficult than normally to separate the fatty from the fibrous capsule I am accomplishing this however without much difficulty I free first the posterior surface of the kidney then the anterior then the inferior pole and then the upper pole and free the kidney entirely except at its pedicle that is the attach

The patient's general condition is good. There is no evidence of serious kidney lesion or heart lesions and he is a first-class surgical risk. I shall operate on the case under general anesthesia and employ drop ether.

As you see I have the patient rolled over on his left side and the assistants have placed a good-sized pad under the left pelvis so as to widen the space between the crest of the ilium and the last rib on the right side. I make an incision beginning at the

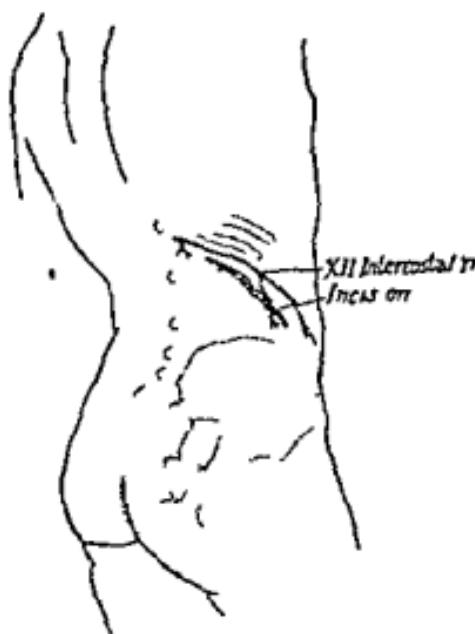


Fig. 157.—Oblique lumbar incision for exposure of kidney and its relation to the crest of the ilium, the twelfth rib and the twelfth intercostal nerve.

costovertebral angle passing downward and outward obliquely to a point about a fingerbreadth above the crest of the ilium (Fig. 157). This divides the skin and superficial fascia and as you see I come now to the muscle—the latissimus dorsi which must be divided. I divide now the layer of lumbar fascia and expose the quadratus lumborum. Continuing the dissection I find a large nerve running parallel with the incision accompanied by an artery and vein of good size. This is the twelfth intercostal nerve with its accompanying vessels. I now divide the

may, I think, properly suture the fat and areolar tissues overlying the posterior surface of the pelvis with fine catgut suture. This I shall do. The kidney is now dropped back into its normal position. I carry down to the point of incision in the pelvis two small cigarette drains and bring these out through the upper part of the external incision. I now close the wound with deep



Fig. 159.—Pyelotomy, the posterior surface of the pelvis of the kidney has been carefully stripped, incised, and a mulberry calculus is being removed by means of a small pair of blunt forceps.

buried catgut through the muscles, and with four silkworm-gut sutures through all of the structures, and with black linen for the integument. A copious gauze dressing is applied. There has been, as you see, very little hemorrhage in the operation—practically none from the incision of the pelvis itself.

The prognosis, of course, in this case is excellent. The after-

ments of the great vessels and the junction of the ureter and pelvis. In doing this I can now feel quite distinctly a stone, which is, fortunately, in the pelvis of the kidney. After freeing the kidney, I gradually, as you see, without any force bring the kidney gently up into and out of the incision. We shall be able to do here the operation of pyelotomy, that is, remove the stone through the incision in the pelvis. It will then not be necessary to do a nephrolithotomy, that is, a division of the secreting substance itself.

Holding the kidney out of the wound, I now take a pair of dissecting forceps without any teeth and free the posterior surface of the pelvis from the fat and areolar tissue covering it, so that I can expose for a distance of $\frac{1}{4}$ inch the posterior surface of the pelvis itself. I think this is quite an important step in the operation because it enables me to see whether there are any large vessels crossing the posterior surface of the pelvis. Nor

recognized in making the incision of pyelotomy

I now make an incision about $\frac{1}{2}$ inch long through the posterior surface of the pelvis, in the long axis of the pelvis, coming down directly on to the stone. I introduce this small pair of blunt forceps which has been a favorite instrument of mine for years in doing these pyelotomies, and one which I also employ frequently in removing stones from the common duct. I grasp the stone and, as you see, I have no difficulty in removing it (Fig. 159). The stone has an uneven surface like that of a mulberry, and is probably an oxalate stone. I shall make no effort to close the incision in the pelvis by suture. There was a time when I paid special attention to this, but I think on the whole it is better not to make any effort at suturing the incision in the pelvis. The structure is very thin walled, and any suture that might be introduced carries with it the possibility of forming a nucleus of another stone. We have found that these incisions heal up so rapidly without suture that for a long time we have discontinued the practice of the introduction of a suture. One

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history in most of these cases has been that we have removed one cigarette drain at the end of forty-eight hours and the second at the end of four or five days and that little or no urine escapes from the pyelotomy wound. There is for twenty-four hours a fair amount of primary wound secretion and occasionally urine escapes for a week or ten days after the operation, but this is the exception. These patients are allowed to sit up on the fourth or fifth day. The silkworm-gut stitches are removed on the eighth or ninth day and patients allowed to leave the hospital by the twelfth day.

I want to take this very simple kidney stone as an opportunity of discussing with you pretty fully the subject of renal calculus. My medical work has covered the entire period of development of modern kidney-stone work and I have taken a special interest in the subject. The first kidney-stone operation was done by Henry Morris a British surgeon in 1880. This was done long before the days of the x-ray and the diagnosis was based upon the clinical findings. Morris in the next few years operated on a number of cases successfully and was able to report some 30 odd cases with but 3 per cent. mortality. In this early period the

* * * * *

case. Nor did we have the means at that time to determine even approximately the functional condition of the two kidneys separately. Yet, in spite of all these handicaps a good deal of excellent surgery was done from the time of Henry Morris' first case in 1880 until the introduction of the x-ray and its employment in detecting renal calculi which occurred in about 1897. In 1898 I was one of the first surgeons to employ the x-ray as a means of diagnosis in kidney stone. Leonard of Philadelphia several years later in an article in the Annals of Surgery discussed quite fully the historic side of this subject and I am glad to say that he found that we in this clinic employed the x-ray in detecting kidney stones before it had been employed in Central Europe. At first of course our x-ray apparatus was crude as compared with our modern machines, and the employment of the x-ray

carried with it the danger of burning the patient. One of my early cases was a patient of about sixty five who had a single stone in the pelvis of the kidney very much the same sort of a picture as in the case we have just operated on. He was x rayed three different times at intervals of a few days and was exposed for from ten to twelve minutes in each one of these exposures and even then the plate which we obtained was not very satisfactory although the stone could be seen covered by the twelfth rib. A few days after the last exposure I operated on the patient and removed the stone. A week later he developed what I then regarded as an atypical erysipelas on the anterior surface of the abdomen. The reddening which deepened and was not associated with much temperature or pain I studied with a good deal of care and demonstrated in my clinic as an atypical erysipelas stating at the time that I had never seen a similar case. This proved later however to be a typical and rather severe x ray burn and this was the first x ray burn I had ever seen. Fortunately it was not of permanent injury to him although it was six or seven weeks before it had completely healed.

With the crude apparatus at first employed a good many stones were missed and not diagnosed in our x ray examination. Gradually however with the improvements that have been introduced stones the size of a pea and larger are readily recognized and detected and in the hands of experts the x ray has become our most certain means of diagnosis in renal calculus.

The general introduction into our clinical work of cystoscopic examination and catheterization of the ureters and examination of the two urines separately and the introduction of the phthalein test has added enormously to our means of making a definite diagnosis in these cases and determining frequently whether we can safely do a nephrectomy in kidney stone cases where because of the number of stones associated infection and destruction of the kidney tissue it becomes necessary in order to secure a permanent cure to remove the kidney at the time of the primary operation.

For a time we did a large amount of work determining the freezing point of the blood with the idea that this might be of

history in most of these cases has been that we have removed one cigarette drain at the end of forty-eight hours and the second at the end of four or five days and that little or no urine escapes from the pyelotomy wound. There is for twenty four hours a fair amount of primary wound secretion, and occasionally urine escapes for a week or ten days after the operation but this is the exception. These patients are allowed to sit up on the fourth or fifth day. The silkworm-gut stitches are removed on the eighth or ninth day and patients allowed to leave the hospital by the twelfth day.

I want to take this very simple kidney stone as an opportunity of discussing with you pretty fully the subject of renal calculus. My medical work has covered the entire period of development of modern kidney-stone work and I have taken a special interest in the subject. The first kidney-stone operation was done by Henry Morris a British surgeon in 1880. This was done long before the days of the α -ray and the diagnosis was based upon the clinical findings. Morris in the next few years operated on a number of cases successfully and was able to report some 30 odd cases with but 3 per cent mortality. In this early period the diagnosis was exceedingly difficult the trained surgeon not knowing whether there were stones in one or both kidneys not knowing the size of the stones or the number of stones in any particular case. Nor did we have the means at that time to determine even approximately the functional condition of the two kidneys separately. Yet in spite of all these handicaps a good deal of excellent surgery was done from the time of Henry Morris' first case in 1880 until the introduction of the α ray and its employment in detecting renal calculi which occurred in about 1897. In 1898 I was one of the first surgeons to employ the α ray as a means of diagnosis in kidney stone. Leonard of Philadelphia several years later in an article in the Annals of Surgery discussed quite fully the historic side of this subject and I am glad to say that he found that we in this clinic employed the α ray in detecting kidney stones before it had been employed in Central Europe. At first of course our α ray apparatus was crude as compared with our modern machines and the employment of the α ray

carried with it the danger of burning the patient. One of my early cases was a patient of about sixty five who had a single stone in the pelvis of the kidney very much the same sort of a picture as in the case we have just operated on. He was x rayed three different times at intervals of a few days and was exposed for from ten to twelve minutes in each one of these exposures and even then the plate which we obtained was not very satisfactory although the stone could be seen covered by the twelfth rib. A few days after the last exposure I operated on the patient and removed the stone. A week later he developed what I then regarded as an atypical erysipelas on the anterior surface of the abdomen. The reddening which deepened and was not associated with much temperature or pain. I studied with a good deal of care and demonstrated in my clinic as an atypical erysipelas stating at the time that I had never seen a similar case. This proved later however to be a typical and rather severe x ray burn and this was the first x ray burn I had ever seen. Fortunately it was not of permanent injury to him although it was six or seven weeks before it had completely healed.

With the crude apparatus at first employed a good many stones were missed and not diagnosed in our x ray examination. Gradually however with the improvements that have been introduced stones the size of a pea and larger are readily recognized and detected and in the hands of experts the x ray has become our most certain means of diagnosis in renal calculus.

The general introduction into our clinical work of cystoscopic examination and catheterization of the ureters and examination of the two urines separately and the introduction of the phthalein test has added enormously to our means of making a definite diagnosis in these cases and determining frequently whether we can safely do a nephrectomy in kidney stone cases where because of the number of stones associated infection and destruction of the kidney tissue it becomes necessary in order to secure a permanent cure to remove the kidney at the time of the primary operation.

For a time we did a large amount of work determining the freezing point of the blood with the idea that this might be of

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operation and removal of the stone through a pyelotomy. The early operations for stones of this size were nephrolithotomies, and surgeons for a long time hesitated to do pyelotomies because of their fear that a permanent fistula might result. It was thought that wounds through kidney tissue heal much more rapidly than incisions in the pelvis. We soon learned, however, that this was not true that incisions in the pelvis heal up quite as readily as incisions through the kidney tissue, and are no more apt to be followed by permanent urinary fistulae. On the other hand we very soon learned that incision of the kidney tissue made in a nephrolithotomy carried with it a great deal of risk from hemorrhage. I have had to do secondary nephrectomies in about 8 or 10 cases within a week or two weeks after I had done a nephrolithotomy, in order to save the life of the patient from secondary hemorrhage. All surgeons who have done a large amount of this work had the same experience. It is therefore, on account of the danger of secondary hemorrhage that we now insist upon a pyelotomy rather than a nephrolithotomy. It is not, however, possible always to do a pyelotomy. In large stones, in multiple stones, in coral-shaped stones that fill the pelvis and calices, it is impossible to remove stones through an incision through the pelvis alone. On that account in a certain number of cases we still have to resort to an incision in the kidney tissue itself. Where this is made, it should be about $\frac{1}{2}$ inch posterior to and parallel with the convex border of the kidney as anatomic investigations show that this particular region contains fewer large blood vessels than does the kidney tissue either in front or behind it (Fig 160). The nephrolithotomy incision should be closed with large, soft catgut introduced through the kidney tissue with a round, non cutting needle. We have never experienced any difficulty in controlling primary hemorrhage in these cases when closing the kidney incision properly with catgut, just as we control hemorrhage from the lip in removing a V shaped piece in the operation for epithelioma of the lip, not by ligating the vessels, but by direct suture with silkworm gut. The hemorrhage that occurs is, as a rule, late, coming on from a week to ten days after the operation. When it does occur it furnishes one of the most

great value in determining the kidney sufficiency and deciding for or against nephrectomy. This, however, has been gradually given up and has been superseded by the more valuable phthalein test and examination of the right and left urines separately.

The development of kidney stone surgery has been such that it now rests upon thoroughly sound and scientific principles. We can point to this subject as an example of triumph for scientific clinical research. A patient coming to us today suffering from the clinical picture suggestive of kidney stones is analyzed scientifically just as the assayer analyzes a bit of mineral submitted to him and in the following way:

First, a careful and complete history of the case is taken, and let us imagine that it is suggestive of renal calculus. The patient is then x-rayed and the presence or absence of kidney calculus determined. We also determine at this time if there are stones present in one or both kidneys, the size of the stones, the number of the stones, shape of the stones, probable location of the stones—

knowledge of the function of the right and left kidney. With this evidence and from evidence obtained of the general physical condition of the patient you can determine the presence of the stone, its location and decide for or against operative interference.

What shall we do with a patient in whom we are able to make a definite diagnosis of kidney stone in the way of therapy? Shall we immediately operate on these cases and remove the stone? Shall we accept this as the routine treatment? Certainly not! Each one of these cases must be analyzed separately as an individual problem. Where we find a single stone in the pelvis of one kidney and the patient is a good surgical risk, if that stone is $\frac{1}{2}$ inch or more in diameter the clear indication is a surgical

operation and removal of the stone through a pyelotomy. The early operations for stones of this size were nephrolithotomies, and surgeons for a long time hesitated to do pyelotomies because of their fear that a permanent fistula might result. It was thought that wounds through kidney tissue heal much more rapidly than incisions in the pelvis. We soon learned, however, that this was not true that incisions in the pelvis heal up quite as readily as incisions through the kidney tissue, and are no more apt to be followed by permanent urinary fistulae. On the other hand we very soon learned that incision of the kidney tissue made in a nephrolithotomy carried with it a great deal of risk from hemorrhage. I have had to do secondary nephrectomies in about 8 or 10 cases within a week or two weeks after I had done a nephrolithotomy, in order to save the life of the patient from secondary hemorrhage. All surgeons who have done a large amount of this work had the same experience. It is, therefore, on account of the danger of secondary hemorrhage that we now insist upon a pyelotomy rather than a nephrolithotomy. It is not, however, possible always to do a pyelotomy. In large stones, in multiple stones, in coral shaped stones that fill the pelvis and calices, it is impossible to remove stones through an incision through the pelvis alone. On that account in a certain number of cases we still have to resort to an incision in the kidney tissue itself. Where this is made, it should be about $\frac{1}{4}$ inch posterior to and parallel with the convex border of the kidney as anatomic investigations show that this particular region contains fewer large blood vessels than does the kidney tissue either in front or behind it (Fig 160). The nephrolithotomy incision should be closed with large, soft catgut introduced through the kidney tissue with a round, non cutting needle. We have never experienced any difficulty in controlling primary hemorrhage in these cases when closing the kidney incision properly with catgut, just as we control hemorrhage from the lip in removing a V shaped piece in the operation for epithelioma of the lip, not by ligating the vessels, but by direct suture with silkworm gut. The hemorrhage that occurs is, as a rule late, coming on from a week to ten days after the operation. When it does occur it furnishes one of the most

distressing pictures that a surgeon can encounter. In our own experience the cases have been very much alike. The hemorrhage is usually not through the external incision, but through the ureter, filling up the bladder with blood-clots, accompanied frequently with attacks of renal colic because of the obstruction of the ureter with a blood-clot. A patient with 80 per cent. or more hemoglobin before operation is found after one of these

hemorrhages to have only 60 per cent. The hemorrhage ceases and the surgeon then washes the blood-clot out of the bladder and hopes there will be no repetition. Unfortunately, however repetition usually does take place two or three days later, and we have followed these cases until after the second or third or fourth hemorrhage the hemoglobin would go down to 35 or less, and then, in order to save the life of the patient, we have done a rapid nephrectomy under gas-oxygen anesthesia, which, of course, controls the hemorrhage and has in our cases enabled us to save the lives of the patients. These nephrectomies can of course, be rapidly made, not requiring as a rule more than five minutes, as the incision is readily opened after removing the sutures the kidney removed, and closure made not with layer suture, but simply with through and through silkworm gut sutures.

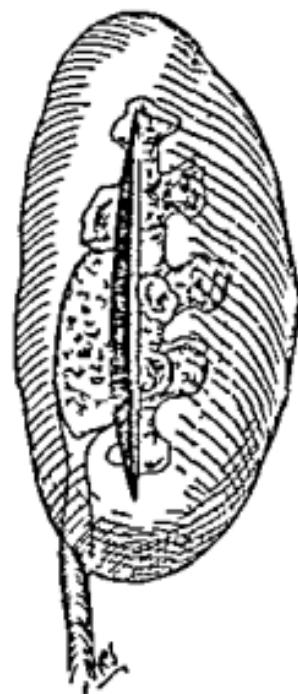


Fig. 160.—Incision for nephrolithotomy; it is so placed as to avoid most of the large vessels in the kidney substance (Brödel's line).

Where a patient has a renal calculus that has passed down into the ureter, the case then presents a different problem. As a rule in our clinic we have taken the position that there is a fair prospect of the passage of the ureteral stone if it is not larger than the size of a coffee-berry, and unless there is some mechanical condition or some emergency demanding operative interference

we have felt that it was wisest to watch these cases for weeks or even months in the hope that the stone would pass through the normal channels and I think this is the sane position to take I have frequently had cases referred to me to be operated upon where the clinical picture was that of renal colic and the x ray showed a stone in the ureter of small size where I have taken the stand that it would be wisest to wait and hope that the stone would be passed and in the majority of cases of this kind the stones are passed and a cutting operation avoided

There is another class of kidney stone cases today in which good judgment I think dictates an extended management in preference to operative interference These are the cases in which kidney stones are found accidentally in making careful x ray examinations of patients suffering from other conditions where there is no clinical picture of distress produced from the presence of calculi especially in cases where there is some organic lesion making the individual a poor surgical risk and where there is no complication demanding immediate interference careful analysis of all of the evidence in cases of this type leads the surgeon to conclude that it is safer not to interfere We have watched quite a large group of these cases and I am satisfied that here as in gall stone disease the trouble given by the presence of the kidney stone varies tremendously I have seen a number of cases where the kidney stones had existed for years and where they were simply innocuous where they gave rise to no symptoms whatever and I have seen cases which after giving rise to symptoms of typical calculus attacks have remained latent for months and years without any recurrence of the attacks The point I want to make is that we cannot properly insist upon operation for the removal of kidney stones merely because we have definite evidence of its presence We must analyze each individual case weigh all the evidence and determine whether in that particular case operative interference or extended treatment is the wisest and safest course to pursue

URETERAL STONE

Summary The diagnosis of ureteral calculus—difficulties in the differentiation from appendicitis—necessity of checking up the x ray evidence—calculus anuria—reflex ileus technic of extraperitoneal removal of ureteral calculi—the intra cystic and penile routes history of a patient with a calculus in a horseshoe kidney

January 11, 1918

AT the last clinic I had the opportunity of presenting to you a patient with stone in the kidney This morning I shall present to you a case in which we have made a diagnosis of stone in the ureter

This patient is a man thirty eight years old who has had repeated attacks of renal colic in the right side, which began about eighteen months ago He has had four sharp attacks requiring morphin and several minor attacks When he came to us a few days ago we found a few red blood corpuscles and a little pus in the urine The character of the attacks have been such that one or two of the physicians who have seen him have thought of the probable diagnosis of appendicitis, because he has had a definite localized tenderness after the attacks in the region of the appendix, and during several attacks there has been a good deal of vomiting and considerable tympany and distention of the abdomen from a reflex paralytic ileus x Ray picture of the kidneys shows no stones, but x ray of the right ureter shows a stone about $\frac{3}{4}$ inch in length and apparently about $\frac{1}{2}$ inch in thickness Pressure over the ureter at the site of the stone which is at a point a little above McBurney's point, elicits tenderness The stone is of such size that I do not think there is any fair prospect of its passing through the ureter On that account we shall remove it by surgical operation

The patient has been anesthetized with drop ether, and, as you see, I have him flat on his back in the same position that we would employ in an ordinary interval appendicitis operation I shall make here a muscle-splitting operation just as we do in the opera-

tion for removal of the appendix, a little larger incision than we ordinarily employ and $\frac{1}{2}$ inch or so external to the ordinary appendix incision (Fig. 161, 1) I divide through the skin and superficial fascia, and split the external oblique parallel with its fibers, and the internal oblique and transversalis in the same way,



Fig. 161.—Incision (1) and dissection (2) for extraperitoneal removal of ureteral calculus

splitting the aponeuroses of these two muscles over the rectus muscle almost to the midline. I am now stripping up the peritoneum from the iliac fossa. I do this without any difficulty, and now come down to the stone in the ureter. The ureter is pretty firmly attached to the peritoneum at this point. With a

careful dissection however with a blunt dissecting forceps I separate the peritoneum from the ureter for a distance of about 3 inches. I now take two blunt hooks and place them under the ureter one about 1 inch above the stone and one about 1 inch below and have the assistant hold the ureter well into the wound (Fig 161 2). With a sharp knife I divide the ureter for a distance of about $\frac{1}{2}$ inch over the stone and without any difficulty lift the stone out and remove it. I shall not attempt to suture this ureter but simply carry down to the incis on a small cigarette drain. I now close the wound just as we would the muscle splitting incision for appendicitis. You will see there has been very little hemorrhage. The prognosis in this case is excellent. The man's general condition is good and I have no doubt that he will go on to a good recovery unless some unusual complication develops.

Stones in the ureter have not been as common in our work as stones in the pelvis of the kidney and calices of the kidney. They have been a rather difficult problem in the past from the standpoint of diagnosis and surgeons have made a great many mistakes and operated a great many cases where ureteral stones were non-existent. The evidence in this case however was very definite and very conclusive and the size of the stone and its position left little doubt as to the diagnosis. Most of the mistakes that have been made in connection with supposed stones in the ureter have been due to x ray findings that showed shadows that were supposed to be stones but which at the time of operation were not found. These shadows have been for the most part due to two different conditions one centers of ossification in the pelvic ligaments especially opposite the spine of the ischium and in a position where they were suggestive of stone in the ureter and second calcification of old tuberculous processes in lymphatic glands in the pelvis and abdomen. I have noted a third unusual condition in a few cases and that is material in the alimentary canal of some kind which is capable of throwing a shadow.

In regard to the means which we have of determining before operation definitely whether these shadows are in the ureter or

not, we have at our disposal a method which will almost invariably prevent these mistakes and that is the introduction of a ureteral catheter and taking an x ray picture with the ureteral catheter in place, using a catheter that will throw a dense shadow. Not infrequently, of course, the ureteral catheter will simply pass to the stone which obstructs the ureter at that point. In other cases, however, the ureteral catheter will slide by the stone, but in these the x ray picture will show the stone lying in close contact with the catheter. In any case in which the evidence is not absolute that the supposed shadow is a stone in the ureter, this method should be resorted to. A short time ago I was called in consultation to see a patient by his attending physician who had had no history of kidney-stone colic but who had had an examination for life insurance and the urine in this examination showed a little pus and a little albumin. An x ray picture was taken and a very definite shadow was found and this was confirmed by two or three plates. This shadow was in the left ureter about 3 inches below the pelvis of the kidney, and the attending physician had called in a surgeon who advised immediate operation. I saw the patient about three days after he had been examined by the first surgeon and asked for a confirmation of the x ray plate. The roentgenologist suggested giving the patient a cathartic to clean out the bowels and then taking the picture. This was done and when the pictures were taken the next day they showed an excellent differentiation—the shadow had disappeared entirely. In this case it was fair to suppose that the body which caused the shadow was in the alimentary canal and was passed in the feces.

I have had a rather interesting experience in 4 or 5 cases making a differentiation between appendicitis and ureteral stone and I have in at least 3 cases operated and removed the appendix in the interval, and then found later by a more thorough

--- " Ureteral stone -- "

splitting incision. Occasionally stones impacted in the lower end of the ureter close to the bladder can be removed by intracystic manipulations, the introduction of a cystoscope, and stretching or incising the internal orifice of the ureter, permitting the removal of the stone from within the bladder. Stones that are no bigger than a coffee berry usually pass, and they may be assisted by throwing some oil into the ureter through the ureteral catheter.

I have had a few unusual experiences in operating on large stones embedded in the lower end of the ureter. One of these was of peculiar interest and was attacked by an unusual route. The patient had suffered for years from repeated serious acute attacks associated with renal colic and followed by the passage of large amounts of pus into the bladder. X Ray examination showed a stone about $1\frac{1}{2}$ inches in length and about 1 inch in diameter embedded in the lower end of the ureter. The man was rather thin, and I decided to remove the stone through the penile route. Placing him in the lithotomy position, I made the old left lateral lithotomy incision, and without dividing the prostate separated the tissues by blunt dissection until I could feel this large stone just above the prostate. I incised the dense connective-tissue capsule in which it was embedded with a pair of scissors and removed the stone without crushing it. I drained the incision for a few days and he went on to an uneventful recovery.

Stones in both ureters are sometimes met with and associated with the picture of anuria. I have had several experiences with cases of this kind. Occasionally, if the patient has had one kidney removed for ureteral stone, the other ureter becomes obstructed by stone and gives the picture of complete mechanical anuria, or we have had this experience also, of one kidney being destroyed and reduced to a hypernephrotic sac or pyonephrosis as a result of calculus disease, and then the ureter of the sound kidney become obstructed with calculus, giving again a picture of complete mechanical anuria. Another type of case, however, is met with, and that is obstruction of the ureter of one kidney, the remaining kidney being perfectly sound, and yet a complete anuria develops.

This has been called reflex anuria. It has been demonstrated in the laboratory that such a condition can be produced by obstructing one ureter and increasing very greatly the intrarenal tension on that side, and have it associated with a reflex effect upon the sound kidney sufficient to prevent its secreting urine. It is surprising how long patients can live in apparently good condition with complete anuria. The first patient of this kind that I saw some twenty years ago was a young man of about twenty five, who was brought to my hospital with the statement that he had not passed any urine for eight days and that the introduction of a catheter into the bladder showed that it was perfectly empty. I was not familiar at that time with the condition of anuria, and I ridiculed the idea that such a thing was possible, and said that there must be some mistake and that it would be impossible for a patient to live for eight days without passing any urine. On investigating the subject, however, I found that patients had lived as long as twenty days with complete mechanical obstruction of both ureters. Mechanical anuria of course, demands operative interference and this cannot be postponed, as a rule, more than two or three days. If the x ray shows definitely the fact that both ureters are blocked with stone and the condition of the patient warrants it, operation should be done for the purpose of removing the stones. If on the other hand the patient is not in good condition, if the cause of the obstruction can not be definitely located and if it cannot be easily and safely removed, the patient should have a pyelotomy and drainage of the pelvis of the kidney done, and best, I think under gas anesthesia. I prefer gas here to ether because of the bad risk that ether would carry to the damaged urinary tract. The operation is, as a rule, not difficult, and there should be introduced into the pelvis a small No. 10 or No. 12 soft rubber catheter, which should be sewed in position. This will provide an escape

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There is one clinical picture in connection with stones in the kidney and ureter which is sometimes most confusing and that is

the simulation of the picture of ileus which sometimes is so suggestive of acute obstruction of the bowel that the surgeon is led to operate with this diagnosis I have had a number of these in my own service the symptom complex being that of sudden acute pain with vomiting gradual distention of the bowel and the impossibility of obtaining any bowel movement and the existence of very little evidence calling attention to the kidney lesion Not infrequently in these cases if the ureter is obstructed by stone there may be no microscopic or gross blood in the urine and no urinary findings suggestive of the presence of stone A thorough x ray examination very often gives us definite information regarding the diagnosis In the symptom complex which I have seen in several cases is one in which because of the persistent and often excessive vomiting the medical attendant has overlooked the real condition and thought of the possibility of a stomach lesion and sometimes a gall bladder lesion I have seen several cases in which severe kidney stone colics have been associated with acute dilatation of the stomach the relationship being that of a reflex gastric ileus due to the kidney colic attack

In discussing kidney and ureteral stone one must from the standpoint of the differential diagnosis take into consideration the other pathologic conditions that give very much the same general clinical picture and these are tuberculosis of the kidney neoplasms of the kidney acute infections such as colon infections of the kidney and congenital cystic disease of the kidney All of these conditions may present in common pus and blood in the urine and the picture of renal colic Usually the differentiation must be made between three conditions kidney and ureteral stone tuberculosis of the kidney and neoplasms of the kidney As a rule the determining evidence of kidney stone is made by the x ray and the determining evidence of tuberculosis by the appearance of tubercle bacilli in the urine and cystoscopic examination of the bladder with the frequent finding of the changes in the bladder mucosa around the ureter of the affected kidney Where after careful examination in a case which presents blood in the urine and the picture of kidney colic you can demonstrate neither the presence of stone in the x ray nor the presence of

tubercle bacilli, one must look to the diagnosis of neoplasm as the most probable cause. Frequently, of course, in these cases the presence of a palpable mass in the kidney region assists materially in the diagnosis.

Blood and pus in the urine associated with kidney colic due to colon infections are by no means uncommon. Here a careful bacteriologic examination demonstrating the presence of the colon bacillus and exclusion by other means of stone, tuberculosis, etc., enables the surgeon, as a rule to arrive at the correct diagnosis.

Blood in the urine with kidney colic due to congenital cystic kidney is a condition we have met with several times, and in some of these cases the well known fact that a congenital cystic kidney is usually bilateral has enabled us to make the correct diagnosis after we have been able to demonstrate the presence of enlarged kidneys on both sides. In one of our cases, however, of an enlarged and cystic kidney the condition was limited to one side, and the diagnosis was not made until the exploratory operation. Fortunately, here a nephrectomy saved the patient's life as he was rapidly going down hill from the continued hemorrhages and had at the time of operation only about 35 per cent hemoglobin.

Some of our kidney and ureteral stones have presented unusual pictures. One of these I shall briefly present to you for the purpose of giving you a more complete picture of this entire subject.

A man of forty five was brought to the clinic with a diagnosis of an obscure abdominal tumor. This was about as large as two fists, and could be palpated in the region between the umbilicus and the symphysis in the midline. The symptoms had been those of acute, severe abdominal attacks associated with chills, fever, and great pain and tenderness over this mass. He had been operated on about six months previously by a surgeon in a neighboring city, who made an exploratory operation and cut down to a mass which he felt he could not remove thought the mass was probably malignant, made the operation purely exploratory, and closed the abdomen. When he came to us we found on making an x-ray examination a shadow of what was consistent with being

a good sized calculus a little to the left of the median line and apparently in this abdominal mass Examination of the urine showed blood and pus On cystoscopying the bladder this was found normal On passing ureteral catheters it was found that these could be passed up but a few inches and then were obstructed An x ray picture with the catheters in place showed that the catheter on the left side led directly up to a shadow of a stone and that on the right side stopped in the center of the abdominal tumor A diagnosis of horseshoe-shaped kidney just above the lumbosacral junction with stone in the left portion of the mass was made An operation was done the patient placed in the Trendelenburg position and the mass exposed The horseshoe-shaped kidney was found and the stone could be distinctly felt in the pelvis of the left kidney This was removed by direct incision into the pelvis a pyelotomy and the wound drained The patient went on to a good operative and permanent recovery



CHOLEMIA FROM OBSTRUCTION DUE TO COMMON DUCT STONE

Summary A patient with jaundice moderate abdominal pain hemorrhage from the gums and progressive loss of weight and strength probable diagnosis exploratory operation—the final diagnosis postoperative course

The case which we shall operate on this morning is a peculiar problem a woman of about thirty who until six months ago was in fairly good health She complains of some pain in the right upper quadrant of the abdomen not a severe colicky attack but a mere sensation of distress which requires no morphin This was followed by the gradual development of jaundice, with loss of weight and strength and the typical picture of cholemia, with hemorrhages from the gums and the hemoglobin going down to 50, and such loss of strength that she could not get out of bed

The case has been very carefully studied by my colleague, Dr Sippy for several weeks A careful examination of the stomach and duodenum shows no evidence of a lesion There has been no blood in the stomach contents and no evidence of pyloric obstruction, no blood in the feces and no evidence of a lesion of either the small or large intestine The urine is normal outside of its high bile content The jaundice has been present for a good many weeks but has varied in intensity She had no temperature until recently, and the last few days she has had a temperature varying from 99 5° to 100 5° F

Physical examination shows some enlargement of the liver and a sense of resistance in the gall bladder region, which may be simply an enlarged liver or distended gall bladder

The case is one of a large group of cases which we have had the opportunity of studying with a good deal of care and in which from the most exhaustive clinical examination it is impossible to decide whether the common duct obstruction, which, of course, is perfectly evident, is due to gall stones or carcinoma of the pancreas or a chronic interstitial pancreatitis or possibly even a

sclerotic process of the liver. On studying the case jointly with my colleague in internal medicine we have come to the conclusion that an exploratory operation is necessary to establish a definite anatomical and pathologic diagnosis admitting any one of the possibilities which I have just mentioned.

The patient's condition was so poor that two days ago we made a direct blood transfusion giving her somewhere from 500 to 600 c.c. This improved somewhat the general appearance of the patient. I have decided to give her a general anesthetic rather than to do the operation under local anesthesia. There can be no doubt but the operation carries with it a great deal of danger of hemorrhage. We recently lost a similar case from continual oozing from the mucosa of the gall bladder. The post mortem in that case showed that the obstruction was due to a mass in the pancreas which was inflammatory and not carcinomatous. Weighing all the evidence I have decided to give this patient the benefit of an exploratory with the hope that we may find conditions that can be relieved permanently or temporarily. If we find gall stones in the common duct and her condition warrants we shall remove them and drain the hepatic duct. If we find a mass in the pancreas as the cause of the obstruction we will probably simply drain the gall bladder.

I am making the usual S-shaped incision which we employ in this clinic. The hemorrhage from dividing the tissues of the abdominal wall is moderate. Opening the peritoneal cavity I find a small contracted gall bladder full of gall stones. I am operating as you see, on the right side of the patient. I shall now go to the left side of the patient and make a careful examination of the cystic and common ducts. Introducing my left index finger into the foramen of Winslow I palpate the right free edge of the gastrohepatic omentum which contains the common duct. I find no stones in the cystic duct, but as I very gently examine the lower part of the common duct between my index

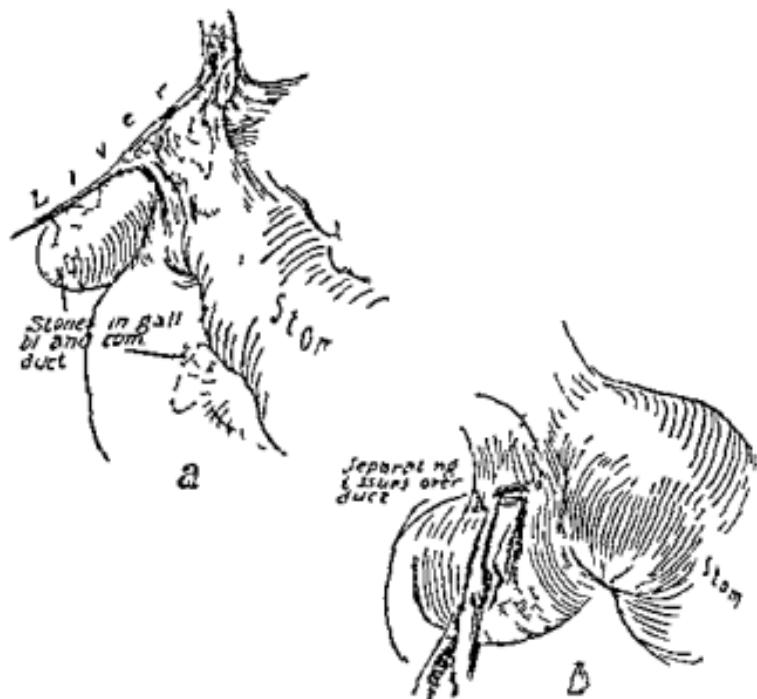


Fig. 162.—*a* Diagnosis of conditions found at operation. Note stones in gall-bladder and in common duct. *b* Approach to common duct above and laterally to duodenum. *c* Abdomen about to be closed. Drainage tubes in gall bladder and common duct, the tube to the latter reinforced by a wick of gauze.

common duct and remove these stones, I shall do this stage of the operation first and do the gall bladder later. I mean, of course, at this sitting providing the condition of the patient warrants it. With my left index finger in the foramen of Winslow I lift up the lower part of the common duct, and in the angle between the duodenum and stomach I find that I can bring the stones up into view, and shall probably be able to incise the duct here and not have to do a transduodenal choledochotomy.

With a pair of fine closed artery forceps I spread apart the peritoneum and areolar tissue and separate these tissues from the anterior surface of the lower part of the common duct so that I can bring the common duct directly into view (Fig. 162, b) I can see the stones shining through its thin wall. Separating these tissues I have divided a small artery, which I want to clamp. Now I have the common duct uncovered I make a small incision, $\frac{1}{2}$ inch long, directly over the stone. Rather to my surprise I find that there is not the single stone I expect, but that this mass is composed of three small faceted stones packed closely together. I remove these and introduce into the common duct a No. 12 catheter, and the bile flows out freely into the peritoneal cavity. This I mop up. I now take a very fine needle and fine catgut suture and suture this catheter into the common duct with one stitch. This one stitch controls the further flow of bile into the peritoneal cavity.

Dr. Herb, our anesthetist, tells me that the patient is in fairly good condition, so that I shall remove the stones in the gall-bladder and drain the gall bladder, as I can do this very rapidly. If she were in excellent condition I would probably remove the gall bladder at this sitting, but that would carry ad-

drainage-tube, about as large as a No. 16 or 18 English catheter. I pack a small strip of iodoform gauze down to the incision in the common duct and close the wound bringing out through the center of the incision the tube in the gall bladder and the tube in

the common duct and the small iodoform gauze wick (Fig. 162, c) I close the external wound in the usual way, using silkworm gut sutures about an inch apart, putting in probably half again as many fixation sutures as we would use in an operation where the patient was a first class surgical risk. I do this because wound repair will be slow here, and in all probability the introduction of a large number of fixation sutures will enable me to take them out by instalments, every other suture probably at the end of ten or twelve days, leaving the balance until I feel sure that wound repair is complete. The patient will be given 8 ounces of normal salt solution by rectum every three or four hours. If she continues to vomit, the stomach will be washed.

I am, of course, greatly gratified to find that she has no carcinoma of the pancreas or chronic interstitial pancreatitis careful examination showing no evidence of either of these conditions. The operation necessarily carries with it a great deal of risk. On the other hand if she recovers, she will be cured of the condition, I think permanently.

It is not, I think, a good plan in doubtful cases such as this to guess at the diagnosis before the exploratory. I think this case illustrates that fact. In accordance with my theory of the probabilities deduced from the experience acquired in the handling of a large series of these cases, I think I would be inclined to favor in this instance, in view of the evidence the diagnosis of obstruction of the common duct from a pancreatic lesion. The safer and better plan, I think, is for us simply to accept the fact in these uncertain problems that the symptom complex can be due to one of a number of conditions, and that the only way we can tell definitely is to obtain the evidence that can only be obtained at exploratory operation.

Postscript—I am glad to say that this patient did surprisingly well after operation and that no hemorrhage developed. There was very free drainage of bile, especially from the tube in the common duct, and some drainage from the tube in the gall bladder. The iodoform wick was removed on the third day. Her temperature did not go above 100 5° F. and within a few days came down to normal. She vomited but once after the

operation, so that it was not necessary to wash out her stomach. She had to be catheterized for a few days. A bowel movement was obtained at the end of seventy two hours and she has proceeded to a very satisfactory recovery. The severe itching associated with the jaundice, of which she complained very bitterly before the operation, ceased entirely after the operation, in accordance with our usual experience, from drainage of bile in these obstructed cases.

The above postscript was written about two weeks after the operation, and the case seemed very favorable. At the end of that time the tube in the common duct was removed and for some days later the case continued to progress in a very satisfactory way. Then she had a severe attack of pain, chills, and a rise of temperature. Bile ceased flowing out of the external fistula and the stools became clay colored. The jaundice, which had largely disappeared, returned. I was for some days in the hope that the symptoms might be due to an edema of the mucous membrane—a cholangitis—but the condition was so persistent that at the end of about three weeks from the time of the first operation I did a second operation, and found, very much to my surprise, three stones in the common duct, one of these of considerable size, $\frac{1}{2}$ inch in diameter, and the others smaller, about the size of an ordinary pea. The larger stone was felt so readily that I cannot understand how it could have been overlooked at the first operation. It may have been in one of the hepatic ducts or in the gall bladder, or low down in the common duct in the portion covered by the pancreas.

The second operation was not difficult technically, and was

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gall bladder. We obtained an examination of the condition through the operative wound, which showed an extensive intra-abdominal hemorrhage. I think, without any question, this was

a slow parenchymatous oozing such as occurs in these jaundice cases, and as I analyze the facts I think it was a mistake to remove the gall-bladder at the second operation I am glad of the opportunity of presenting this postscript to complete the history of the case.

LARGE ULCERATING SARCOMA OF THE NECK

Surgery Management of malignant tumor of the face and neck in which complete surgical removal is impossible—the combination of removal of as much of the growth as possible, starvation of the region by ligation of its arterial supply and exposure to the rays.

THE second case which I shall show you this morning is a patient who comes to us with a huge ulcerating malignant tumor of the side of the neck. She has consulted a number of surgeons and they have given her the opinion that the case was inoperable. The patient is a deplorable object. I shall show you the patient before we anesthetize her. The mass is as large as a good sized cauliflower about 8 or 9 inches from above downward and 6 or 7 inches from side to side extending from the lobe of the ear down almost to the clavicle. It is at its thickest part 3 or 4 inches in thickness and in the center is a great big sloughing mass which produces an exceedingly foul odor. This patient refused an operation early in the development of this process but recently has been very anxious to have an attempt made to remove this great ulcerating mass.

I have had a section removed and the microscope shows that it is a small round cell sarcoma. It is pretty evident that a radical operation gives little prospect of permanent cure in this case. I am going therefore to undertake what I regard as a palliative operation removing this great ulcerating mass, getting rid of the foul odor, the danger of hemorrhage and the toxemia that is associated with the absorption from such a large ulcerating malignant growth and then if the woman survives the operation give her the benefit of the rays.

The patient is now anesthetized. We have sterilized the big ulcerating field with tincture of iodin as well as we can and the tissues about this ulcerating mass also with tincture of iodin. I shall first ligate the external carotid artery, the branches of which supply most of this tissue involved in the tumor mass.

In order to do this I have to make an incision in front of the tumor mass push the tumor back over the sternocleidomastoid and expose the carotid artery at its divisions into internal and external. I now find the external artery and assure myself that it is the external carotid by determining that coming from it are the large arterial branches the superior thyroid, lingual and facial. I now ligate the external carotid just below the superior thyroid artery. This does not do away with the venous hemorrhage in the operation but it aids very materially in controlling the



Fig. 163. Huge ulcerating carcinoma of neck at appearance just before operation.

total amount of blood lost. It is also of value in saving the tissues making subsequent growth of the malignant process less rapid and even making it possible to secure a greater effect from the x-ray treatment to which this area will be subjected.

I now rapidly dissect out the huge mass leaving at the bottom of the wound deeply situated in the neck evidently the tumor tissue which I cauterize very thoroughly with a large Laquelin cautery. The huge raw surface is now covered with a layer of iodoform gauze and over this I pack a large mass of simple

gauze and put on a rather firm soft gauze roller, and over this a starch bandage.

Postscript—The after history of this case has more than justified the operation which we have undertaken. Very shortly after her recovery from the immediate effects of the operation, on the third or fourth day, we began x-ray treatments. The woman improved surprisingly after the removal of this great ulcerating mass. Her appetite returned and she gained 20 or



Fig. 164.—Patient two months after operation. There are no masses demonstrable in the region of the original tumor, but marked edema of that side of the head and face has appeared in the last few weeks, and a mass is now to be felt beneath the left breast.

30 pounds in weight, and without any skin grafting the greater part of this area has become covered in with normal epidermis. Compare photograph of lesion before operation and condition of patient at the present time (Figs. 163 and 164).

You will see at a glance that it has been well worth while to give the patient the benefit of this surgical procedure, although there is even now I think no prospect of a permanent cure. We are doing in this clinic a large series of palliative operations for very extensive malignant processes about the head and neck,

and the results have convinced me that it is our duty to give these patients the benefit of such surgical therapy. We are attacking them from the standpoint of cutting off their blood supply and removing the gross lesion and of submitting the field of operation to x ray and radium. There of course should be a very complete understanding with the family of the patient in a case of this kind. They should have explained to them the fact that the lesion is very far advanced and that the operation in all probability will be palliative and where there is no prospect whatever of permanent cure the statement should be made that there is simply this possibility of permanent benefit. In talking with the patients themselves however after having had such a full and frank talk with the friends and relatives I take a more optimistic view and without urging the undertaking of the palliative operation explain fairly fully the possibilities to them and make the statement that it will give them a fighting chance. The hopelessness—the mental depression of these cases that are told that nothing further can be done that they are doomed to death from cancer together with the hemorrhage, ulceration, foul odor and cachexia make a most distressing picture. On the other hand the improved mental attitude aroused by the hope of getting rid of the process, the general improvement after removal of the gross lesion and the relief from pain which follow such an operation as this make a sharp contrast strongly in favor of giving the patient the benefit of the doubt and the benefit of the operation.

HUGE FIBROMA PRIMARY IN THE MESENTERY AT THE ILEOCECAL JUNCTION

Summary A patient presenting an enormous solid tumor filling the entire abdomen—the probable diagnosis—operative findings—accidental wound of intestine necessitating resection technique of abdominal closure the mattress fixation suture remarks on large abdominal tumors other than those arising from uterus or adnexa

WE have this morning a very unusual and very interesting problem in abdominal surgery in a case which has been under observation for some days and one in which we have made the clinical diagnosis of a tumor either of the omentum or of the mesentery

The patient is a young man of about thirty, who has been very well and very strong and is even now in very good general condition. A few weeks ago he complained of some abdominal pain. He consulted a physician who discovered that he had a very large apparently solid tumor filling at least three fourths of the abdomen—all of the abdomen, in fact, except a small part of the lower left quadrant.

Analysis of the symptoms shows practically nothing beyond some pain which he complained of some days ago and which has largely disappeared, and the existence of this large mass. There are no symptoms of obstruction of the bowel. There are no stomach symptoms. There are no symptoms referable to the liver or bile tracts or to the pancreas. The question of whether this large tumor can be associated with the right kidney has been very carefully gone into. The ureter on the right side catheterized, and the kidney found normal. There has been no blood or pus in the urine. There is no temperature. Examination of the blood shows that it is normal. There are no signs pointing to leukemia. The tumor, on examination feels like a huge spleen except that it is located more on the right side than on the left. There is no transposition of the viscera.

I have thought of a number of possibilities in the case, as one naturally would in the case of a large tumor in this location. I thought first of a kidney tumor and then of a large tumor in connection with the liver. I have seen one case of huge simple

tumor either of the omentum or of the mesentery is the most probable. As to the character of the tumor, whether it is benign or malignant, we can, of course, express no definite opinion without examining it microscopically. There are no evidences of malignancy, the man's general health being excellent. On the other hand, we seldom find a tumor of this size in the abdomen that is benign.

I am going to make in this case a very large S-shaped incision extending from the ensiform cartilage downward and outward to the middle of the rectus muscle, and then split the rectus parallel with its fibers to a point several inches below the umbilicus, and then curve the lower part of the incision down toward Poupart's ligament and divide the rectus completely in the lower part of the incision. This will give me a very large exposure and enable me to remove the tumor if it is found that this is possible.

The patient is now thoroughly under the anesthetic and I am making the large curved incision which I have planned. Opening the peritoneum, I come down to this large tumor which is adherent to the anterior parietal peritoneum. You notice that as I separate the peritoneum from the tumor there is a considerable amount of venous hemorrhage. The tumor is closely attached as far as I can see by inspection to the peritoneum of the abdominal wall. The hemorrhage is so free that I question in my mind whether we can remove this tumor and have the man leave the operating table alive. Anatomically what I find here reminds me very much of the conditions in a Talma operation in cases of cirrhosis of the liver, where we plaster the omentum to the parietal peritoneum with the hope of obtaining a free anastomosis between the general systemic circulation and the portal circula-

tion We have here very much the same condition of affairs There are large veins developed between this tumor and the peritoneum which probably connect with the portal circulation, on the one hand, and with the systemic circulation on the other The man's general condition is so good and it seems so absolutely necessary to remove this tumor because of its huge size, compromising the viscera in the abdominal cavity, that I am going to make an effort to remove it even though this carries a good deal of risk with it As you see, I am as rapidly as possible sweeping my hand in between the parietal peritoneum and the tumor and separating these adhesions As I continue this separation I now reach a space in the left upper pole of the tumor where I enter the free peritoneal cavity

I now rapidly free the tumor entirely from the parietal peritoneum, causing a very great deal of venous hemorrhage Having the assistant press on the abdominal wall on either side, I am now delivering one margin of the tumor and, as you see, I have delivered it entirely from the abdominal cavity I rapidly pack some very large dry abdominal pads into the space from which I removed the tumor As I lift the tumor into view you can see that attached to it is a very broad pedicle, and as I study the structures in this pedicle I find that they consist of the small intestine and of the large intestine adherent to the under surface of the tumor for a distance of about 5 or 6 inches I should say that the tumor is probably 18 or 20 inches long, 12 or 14 inches wide, and about 8 inches thick I clamp the pedicle of the tumor as close as I can to the tumor with as you see, four or five strong curved artery forces I divide the pedicle distal to these forceps and remove the tumor, so that I can complete the rest of the operation, which would be impossible otherwise The venous hemorrhage I am glad to say, has now ceased

On careful examination of this pedicle I find that it consists of the ileum and cecum at the junction of these two structures I find also that the part of the pedicle which I have divided opened the cecum for a distance of about 1 inch and the ileum for a distance of about 2 inches It will, therefore, be necessary to resect this portion of the bowel I do this more willingly because

from the size of the tumor it is fair to suppose that it is a sarcoma, and we can in this way make the operation a radical one



Fig 165.—Tumor delivered and pedicle, attached to ileocecal junction, grasped by forceps preparatory to amputation. Outline of tumor and S-shaped incision on abdominal wall.

In resecting this portion of the bowel I first divide the external layer of the mesentery, which is avascular, and bring the cecum



Fig. 166.—Pedicle containing portions of ileum and cecum which were cut through when pedicle was severed. Dotted line indicates incision for resection of injured area, lateral anastomosis of ileum to transverse colon shown in insert.

and lowest part of the ileum well into view. I ligate the mesentery of the last 4 or 5 inches of the ileum and of the cecum for 4 or 5 inches. Now, with intestinal clamps on the intestine in order to

prevent the intestinal contents from pouring into the peritoneal cavity, I remove the 7 or 8 inches of the large and small bowel at the ileocecal junction. I close the cecum with three rows of sutures and close the ileum in the same way. I now make a



Fig. 167.—Method of closure of abdominal wall, illustrating especially the giant tension sutures

lateral anastomosis between the ileum and the first part of the transverse colon. I do this because it is difficult for me to make

with three rows of sutures and with clamps applied to both the large and small bowel in just the same way that you would do a gastro enterostomy. The peritoneal cavity now is wiped free from blood clots. A couple of cigarette drains are carried down to the point of this anastomosis and the abdominal wall is closed in the usual way with the addition of three large mattress fixation sutures which I am employing in this case because of the great length of the incision. We are very fond of using these mattress sutures in a case of this kind and strongly advocate their employment. I want to call your attention to the way in which we use them. We take a strong piece of black waxed silk or silkworm gut which of course has been sterilized. As a matter of fact it is the antiseptic waxed silk which was used in this clinic years ago by Moses Gunn silk which has been boiled in wax to which 10 per cent carbolic acid has been added. Then the silk is smoothed down and the extra amount of wax rubbed off with a sterile piece of gauze and kept in a protected jar for use. I use a rather strong piece of silk as you see taking a piece about 24 or 30 inches in length doubling it and tying the ends together. The needle is now passed through all the layers of the abdominal wall except the peritoneum at a point $\frac{1}{2}$ to $\frac{3}{4}$ inch from the edge of the incision. In the loop formed by tying the silk together we place a little piece of cigarette drain on the opposite side. This mattress suture as you see demands the passage of the needle but once through the tissues and so gives you the best possible effect of the mattress sutures. We not infrequently employ this in operating for large postoperative hernias. We employ it in laparotomies on all large stout people. We employ it also in operating on individuals who are anemic and run down as carcinoma cases where wound repair is slow and where it is desirable to maintain approximation by sutures for often a much longer time than the ordinary ten day period. We also employ these same mattress sutures in cases of spontaneous reopening of the abdominal incision where at the end of ten days or even twelve days after the stitches have been removed the abdominal wound opens up during some attack of coughing or vomiting and the abdominal contents are forced into or out of the incision. In such a case we do not

anesthetize the patient again, but simply infiltrate the edges of the abdominal incision with a local anesthetic, apothecin or novocain, and then pass these through and through mattress sutures bringing the edges of the incision together as I have described. In this particular accident these mattress sutures are most satisfactory.

This patient is in very good general condition considering the protracted character of the operation and the great loss of blood. The tumor on cross-section is a great solid mass, either fibroma or fibrosarcoma. The microscope will have to determine the diagnosis.

As far as the after treatment is concerned, it will consist in giving the patient 8 or 10 ounces of normal salt solution by rectum every three or four hours washing out his stomach if he vomits, and the administration of a minimum amount of morphin if he has great pain.

I want to say a word or two in this connection in regard to the very large abdominal tumors that have been brought from time to time to our service. In children, as you know, most of these huge abdominal tumors are sarcomas of the kidney. In one case which we had three or four years ago a very large tumor filling the entire abdomen in a child proved to be a simple cyst of the liver, which filled the entire abdominal cavity, the liver being thinned out at its upper pole. Fortunately, we were able by sponge dissection to wipe the liver from the cyst and from the attachments to the peritoneum and remove the cyst, with the resultant entire and uninterrupted recovery of the patient.

We have had a number of huge abdominal tumors which proved to be hypernephromas with extension to the abdominal viscera and, of course, many of these very large abdominal tumors on analysis proved to be enlargement of the spleen from one of several pathologic conditions. I am speaking now of large abdominal tumors which are not associated with the uterus or the uterine appendages.

Where a tumor fills the greater part of the abdomen and we cannot determine the anatomic starting point by palpation the case may present other evidence which enables us readily to

make a diagnosis, as, for instance, in a kidney tumor presenting definite evidences pointing to the kidney of one or the other side, or in a huge leukemic spleen a blood examination may at once make the diagnosis clear. Inflation of the colon with gas and the determination of the relation between the colon and the tumor not infrequently gives valuable information. But many of these cases as the case which we have just operated upon, cysts of the liver, cysts of the spleen and even kidney tumors that are not associated with hemorrhage or other urinary disturbances, may be so obscure that we must frankly admit that the diagnosis is not possible without an exploratory operation. We should not employ exploratory operation as a means of diagnosis, however, until every other possible means has been thoroughly exhausted.

Postscript.—Microscopic examination of the tumor showed that it was a fibroma. The patient did not do well after the operation. He had a good deal of shock from hemorrhage and persistent vomiting. This was handled by washing out the stomach and by normal salt per rectum, but it continued with dilatation of the stomach and with paralytic ileus, which proved to be fatal at the end of the fifth day.

In the light of the knowledge that I now have of the case—that it was a fibroma and not a fibrosarcoma—I have analyzed the facts carefully and wonder if it would not have been possible for me to remove the capsule of the fibroma without injuring either the cecum or the ileum, thus shortening the operation and preventing the necessity of a resection. On looking over the specimen however, with a great deal of care I find that the ileum and cecum are so plastered to the under surface of the tumor that it would have been practically impossible to have carried out such a technic. There can be no doubt that in the removal of a huge tumor of this kind associated with very great hemorrhage and necessitating a resection of the intestines there is a very great and unjustifiable risk to the patient. On the other hand we are confronted with the fact that the continued rapid growth of this very large tumor would have produced such pressure on the abdominal viscera as to have been incompatible with life.

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JEJUNAL OBSTRUCTION DUE TO ADHESIONS ABOUT SITE OF GASTRO ENTEROSTOMY

Summary A patient with abdominal distress greatly increased as the result of laparotomy with gastro-enterostomy operation—restoration of the normal channels—role of the suture in the production of jejunal ulcer following gastro-jejunostomy—probably a coincidence rather than a causal factor necessity of preventing unnecessary operations—importance of co-operation between internist and surgeon

I HAVE a very interesting case to present to you this morning a woman of thirty eight who comes in with the following history

She complains of more or less abdominal distress of vague origin and not very definite in character occurring on three or four different occasions covering a period of about a year, necessitating the use of the hot water bag but not necessitating the use of morphin. She was seen by several physicians one of whom diagnosed the case as gall stones and advised her to have an operation. At the time of operation he found nothing wrong with the gall bladder and proceeded to make an anterior gastro enterostomy, for just what reason I am unable to say, as there seemed to be no history of pyloric obstruction and no definite history of either stomach or duodenal ulcer. Following the operation the patient gradually developed a great deal of stomach distress and finally acute attacks of intense pain coming on after meals sometimes daily which required morphin for their relief.

After seeing a number of physicians she drifted into the hands of Dr. Sippy at the Presbyterian Hospital who very carefully studied the case and analyzed the evidence. He was fortunate enough to examine her with a barium meal during one of these attacks. The pylorus was apparently patulous and there appeared to be a great distention of a loop of intestine apparently in the loop employed in making the anterior gastro enterostomy. This you will see very plainly in the x ray plate which I will

show you. In addition to these findings she also has a postoperative hernia at the site of the scar.

Dr Sippy was inclined to make a clinical diagnosis of obstruction in the intestinal loop involved in the anterior gastro-enterostomy. He is willing to accept the possibility of an associated gall-bladder affair, and to this I am inclined to add as a possibility the postoperative hernia, on the theory that this may be associated with the obstruction in the loop. There are no earmarks of carcinoma or gastric or duodenal ulcer. The attacks are so frequent and so severe that the patient absolutely demands relief, and we shall make this morning an exploratory laparotomy to determine the condition and see if we cannot relieve the symptoms.

Under ether I am excising the abdominal scar over the site of the hernia and find a very distinct hernial sac, projecting into the space between the skin and the abdominal muscles. I shall first separate this peritoneal sac and remove the excess of peritoneum, leaving just enough to make a good closure. Projecting into this space you see a distended, rather stiffened coil of small intestine, rather unusual in appearance, not the flaccid appearance of the ordinary jejunum, but the appearance of a coil of intestine that is contracting and attempting to empty itself. As I lift this into view I find that this coil extends from the beginning of the jejunum to the gastro-enterostomy opening with evidence of hypertrophy of its musculature. At the gastro-enterostomy opening the intestines are matted together by large masses of adhesions, twisted and occluded by these adhesions in such a way as easily to produce obstructive symptoms (Fig. 168, a). Lifting up the pylorus and duodenum I find no evidence of any thickening suggestive of either ulcer or carcinoma. I now examine the gall bladder and ducts and find that the gall bladder is normal in appearance, and that I can readily empty it, and I find no stones either in the gall bladder cystic or common ducts. It seems to me that the indications are here very plain that is, that the symptoms which she has been suffering from are due to an obstruction in the loop of bowel extending from the jejunum to the anterior gastro-enterostomy and that this condi-



Fig. 168.—*a*. Abdomen opened, exposing obstructed loop of jejunum and surrounding adhesions. *b*. Re-establishment of natural channels by cutting through site of old gastro-enterostomy and closure of gastric and jejunal openings.

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Fig. 168—*a*, Abdomen opened, exposing obstructed loop of jejunum and surrounding adhesions. *b*, Re-establishment of natural channels by cutting through site of old gastro-enterostomy and closure of gastric and jejunal openings.

tion can be corrected by separating the bowel from the stomach closing carefully the opening in each vicus and restoring conditions to normal.

I now separate the adhesions around the gastro-enterostomy opening and you see it has taken fifteen or twenty minutes before we can separate these so as to see clearly the entire line of attachment between the stomach and bowel. I now place a rubber protected clamp on the stomach and one on the jejunum so as to prevent any of the stomach or intestinal contents from escaping and carefully separate the stomach from the intestines. In doing this we want to be sure to make the separation in the mucosa at exactly the line of junction of stomach and intestinal mucosa. If you keep this matter in mind it is not difficult to do this and to distinguish between the smooth stomach mucosa and the folds of the intestinal mucosa. I have now completed the separation and shall suture the intestinal mucosa with one layer of linen suture and then bring together the muscularis and peritoneum and finally a third Lembert layer which as you see I put in after I remove the clamp from the intestine as in this way we can make a more accurate approximation and see distinctly whether there is any hemorrhage (Fig. 168 b). I want to call your attention to the fact that I am using a very fine cambic needle and quite fine linen and that the linen has been run through sterile vaselin so as to make it perfectly smooth and does not tear the tissues as it is pulled through the coats of the bowel. This is simply a little step in the technic that I regard as exceedingly important.

I want to call your attention to the fact that the original gastro-enterostomy was made with large black sutures and that these can be readily seen projecting into the bowel and also another row of sutures seen interruptedly under the peritoneum. There is however no evidence of a jejunal ulcer at this point. I am rather inclined to believe that where large massive threads like this are employed they remain hanging permanently in the gastro-enterostomy and that they do not very often give rise to trouble. Dr. Will Mayo is inclined to attribute the development of jejunal ulcers to these sutures. It is possible that they are

etiological factors. On the other hand, I think that where we undo a large number of these gastro-enterostomies, as we are doing this morning, we would find fairly constantly threads present and jejunal ulcers not present, or else in a very small percentage I am personally more inclined to regard the threads as incidents and possible factors in jejunal ulcer than as essential factors, and to attribute the development of jejunal ulcers to the continuation of the high acidity and corrosive effect of the gastric juices at the point of the gastro-enterostomy, which then, anatomically, is situated in relation to this corrosive effect in exactly the same situation as the first part of the duodenum, where peptic ulcers so frequently develop.

I am now closing the opening in the stomach in the same way with three rows of sutures. I carefully wipe off with moist sponges both the bowel and the stomach, removing here a little blood clot and then drop both the stomach and intestines back into the abdominal cavity and close the wound without any drainage.

I am very glad to be able to show you this case, because it is one of a considerable series of similar cases that we have had on our service. I think that we are probably not having these sent to us as frequently as we did a few years ago. There is a certain moral to be learned from a case of this kind. Here is a woman who has an exploratory operation for some uncertain abdominal distress, and the surgeon then performs what seems at this time with the evidence we now have an unnecessary gastro-enterostomy. This operation produced infinitely more trouble than she had ever had before, and another operation is required to undo the gastro enterostomy and to restore the alimentary canal to its normal condition. Some years ago I think in almost all clinics too many gastro enterostomies were done and many gastro enterostomies done without any clear indications. Today on our service we are demanding very definite reasons for doing a gastro enterostomy, and these reasons must be demonstrable gross, tangible, and unmistakable. There was a time when the surgeon would make a diagnosis of gastric or duodenal ulcer, or his medical colleague would make this diagnosis, and a gastro en-

terostomy would be agreed upon and at the time of operation if no definite gross evidence of ulcer was found they would at times nevertheless go ahead with the gastro-enterostomy on the basis that the ulcer might be small limited to the mucous membrane and of such character that it could not be felt by the palpating finger. Then the surgeon would go ahead with the operation on this line of reasoning because in his opinion the clinical evidence of ulcer was sufficient to warrant the procedure. I do not think that this should any longer be done. In many of the cases where an unnecessary gastro-enterostomy is made the patient may not suffer from the resulting deformity, but certainly in a very large proportion the patient suffers more or less distress and in some cases very marked distress as in this particular case.

I have seen so many unnecessary operations on the stomach and the intestines gastro-enterostomies ileosigmo dostonies resections of the colon, etc. where the patients were not only not benefited by the operation, but very greatly injured by it. I have come to take a very definite stand against these operations when they are unnecessary and against the doing of this work by incompetent and unreliable surgeons. At the last meeting of the American Surgical Association in New York I presented a paper incorporating some of these views before the surgical section. The paper was entitled, 'Unnecessary Operations by Incompetent Surgeons'. One of the conclusions which I have arrived at is that there will be less of this unnecessary work if these cases are handled jointly by a good internist and an operating surgeon. I think we have advanced far enough in the study of these cases to warrant our taking the position of demanding gross evidence of obstruction before we undertake any of these anastomosing and de-tracking surgical procedures.

In closing the abdominal wound we must take great care to prevent a recurrence of the postoperative hernia and I want particularly to call your attention to the technic which we have learned to employ in these cases. We close as you see the

suturing closing a very large abdominal incision for the removal of a huge fibroma developing from the mesentery at the junction of the cecum and the ileum and you will remember that I described the use of these large mattress sutures in detail at that time. In this case we shall use these mattress sutures tying them over a small piece of cigarette drain. I am closing the anterior sheath of the rectus with catgut and the skin with a fine black silk. One word of caution in regard to the removal of these sutures. Our usual routine is to remove the silk at the end of about the ninth or tenth day every other one of the mattress sutures about two days later and then about two days later that is at the end of the thirteenth or fourteenth day the balance of the sutures are removed care being taken however to strap the whole abdomen at this point firmly with adhesive straps.

Postscript—I am glad to say that the patient made an uneventful recovery and had no vomiting following the operation that the old pains due to the obstruction in the jejunum disappeared entirely and have not recurred and she has made an excellent recovery showing that the anterior gastro-enterostomy with its adhesions was responsible for these attacks.

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In closing the abdominal wound we must take great care to prevent a recurrence of the postoperative hernia and I want particularly to call your attention to the technic which we have learned to employ in these cases. We close as you see the peritoneum by moderate size catgut suture and then I introduce, about an inch apart, mattress sutures of silk-worm gut. Those of you who were at my last clinic saw me employ this method of

CLINIC OF DR GUSTAV KOLISCHER AND DR J S EISENSTAEDT

MICHAEL REESE HOSPITAL

URETERAL STONE

Summary Scientific diagnosis of ureteral calculi; analysis of the methods employed and the logical deductions from each step of the examination treatment—ureterotomy a last resort—when permissible endoscopic methods—the theory of their application practical results

THE patient under consideration reports that about a year ago he was taken with sudden pain in the right epigastric region and that these pains were of a colicky character and radiated downward into the penis. The pains were severe from the onset and increased in intensity almost beyond endurance, and then by degrees abated until they finally subsided.

The urine passed after this attack was stained a dark red. Inside of a few days the urine cleared up. The right flank, however, remained the seat of uneasiness for about a week.

The patient felt well until about three days ago, when he again was seized with an attack similar to that previously mentioned, showing this time, however, the change in the site of the pain from the right epigastric region to the right hypogastric region. The irradiation of the pain was mainly felt alongside the right inguinal canal down into the right half of the scrotum. The urine passed after the onset of this attack was slightly turbid and has remained in this condition up to the present. The right hypogastric region is still the seat of a dull ache and palpation of this area shows it to be sensitive. Increased frequency of urinary calls is reported. The patient presents himself for relief.

The routine examination of the chest and abdomen does not lead one to any definite conclusion, so we proceed to more

the roentgenogram and the right kidney does not show any pronounced shadow within its contour but near the edge of the iliac bone a shadow of oblong shape and of somewhat irregular outline is seen

A shadowgraph catheter is now passed into the right ureter beyond the point of the obstruction found at the time of the first catheterization and again encountered during this latter sounding and another x ray picture of the lower urinary tract of this side is taken. In this picture the above mentioned shadow appears again and it is also noted that it is in close apposition to the shadow produced by the opaque ureteral catheter.

The analysis of all the observations quoted will permit the following conclusions:

There is no abnormality traceable to the left kidney and ureter. The right kidney is also evidenced as non pathologic. In the right ureter an obstruction apparent to the tactile sense is met. Its presence is further accentuated by the accumulation of urine in a distended sector of the ureter which phenomenon is always noticeable above a narrowing of ureteral lumen produced by an intra ureteric obstacle. That this distention is limited to a small sector only is proved by the fact that after the catheter has overcome this obstruction and the urine accumulated in this pouch is evacuated the regular ejaculations of the ureter are resumed. That this was and is caused by a foreign body inside of the ureter is made evident by these facts: the catheter meets an obstacle and at the site of its arrest there appears in the second x ray plate a shadow in intimate contact with the shadow of the opaque catheter. There is no doubt that we have to deal with a urinary concretion arrested inside of the right ureter at this particular location a ureteral calculus that only partially occludes the lumen.

The abnormal admixtures to the urine collected from the right side and the subjective symptoms form an appeal to the surgeon to remove the foreign body which causes the obstruction and it remains to discuss and to choose the method to be employed.

specialized investigation. The location of the pain and the urinalyses naturally would direct our attention to the uro-urologic system. The analysis of the urine does not show any abnormality in regard to the elimination of solids while the microscopic examination reveals the presence of a few red blood-cells, numerous leukocytes, epithelial cells, and some nondescript débris.

In order to determine the provenience of these pathologic admixtures we now turn to the direct examination of the bladder, ureters and kidneys that is, to the instrumental and ocular revision of this entire tract. This is accomplished by cystoscopy and ureteral catheterization.

While the inspection of the urinary bladder will clear up the situation as to the condition of this viscus, the special observation of the ureteral openings and the employment of the ureteral sounds and catheters will furnish additional information as to the patency of these tubes and by collecting the urine separately from either kidney diagnostic pointers concerning the condition of these latter organs may be gleaned.

Cystoscopy shows the vesical mucosa to be normal. The same holds good of the left ureteral mouth while the right one appears to be rounded out and pouting, its edge appearing to be somewhat edematous. The urinary whorls emanating from the left ureteral mouth seem to be more active than those on the right side.

On the left side the ureteral catheter passes up into the renal pelvis without any difficulty and after it is withdrawn there is noted rhythmic ejaculation of urine. On the right side the catheter is arrested at a point about 10 cm above the vesical opening of the ureter. Under pressure the catheter overcomes the obstacle with a slight jerk and glides upward. When the obstruction has been passed a rapid trickling of urine is observed from the distal end of the catheter. After this gush stops regular rhythmic ejections of small quantities of urine are noticed. Both catheters are now withdrawn and renal and ureteral x-ray pictures are taken.

The left side does not present any apparent abnormalities in

position or by becoming impacted in one of the physiologic narrowings of the ureter—in this instance, in the one near the pelvic brim. The arrest of the stone and its lodgment in one place for a long time may lead to an increase in the size of the calculus by apposition of urinary salts. This phenomenon explains, in turn, the fact that the stone remains in the same location and increases the obstruction, leading to a partial distention of the ureter just above it, which temporary sacculation becomes filled with urine. That this calculus did not lead to complete occlusion is proved by the continuance of urinary ejaculations from the ureteral mouth, though diminished in number and energy. This partial patulence of the ureter is explained by the fact that the stone by virtue of its shape and size does not completely fill the lumen. The disappearance of blood from the urine is explained by the freeing of the pelvis from its extraneous contents, while the débris in the urine is evidently derived from the affected part of the ureteral wall, kidney elements being absent from the specimen. This assumption is made more plausible by the fact that ureteral calculus in its travel downward and in its arrest at the place finally located did not cause any acute subjective symptoms until the trauma to the ureteral sector in question reached such a degree as to excite definite reaction and forcible contractions perceived as colicky pains.

The selection of the therapeutic measures to be used in cases of ureteral stone must be determined with care and deliberation. The main consideration should be, Is the risk of a surgical intervention out of proportion with the gravity of the pathologic condition to be remedied?

It is a matter of statistical experience that about 80 per cent of all ureteral concretions sooner or later are spontaneously evacuated into the bladder, from whence they are expelled either with the urinary stream or may easily be pumped out by means of an evacuator. It is furthermore, a matter of record that ureteral catheterization and lubricating and dilating the ureter by injection and inflation will bring down to the bladder most of the concretions. Exceptions to this rule are

Ureteral stones may be removed either by endoscopic methods or by ureterotomy, that is the bloody exposure and opening of the ureter. It requires no argument to prove the contention that the procedure which necessitates no previous destruction, if effective at all will have the preference over a procedure which calls for operation with a knife and which includes all the risks incurred by any operative interference.

The mechanical removal of intraureteral stone above its intramural end may be accomplished by loosening the concretion by touching it with ureteral sounds and injecting some lubricating fluid through a ureteral catheter beyond the stone if possible and by continuing the injection while the catheter is slowly withdrawn. By this procedure the ureter is dilated, its inner surface is lubricated and contractions are elicited which further the delivery of the stone. Or a ureteral catheter the eye of which is hermetically sealed by a piece of very thin rubber tissue is passed up to the stone. Air is then forced into the catheter ballooning the eye cover. By now withdrawing the catheter its thickened end dilates the ureter beneath the calculus and the stone will follow the catheter in its descent. If repeated attempts of this kind fail and the objective and subjective symptoms become urgent ureterotomy is to be considered.

In analyzing the history of this case one may assume that the original attack was caused by a stone in the pelvis of the kidney. This is indicated by the location of the pain which was caused by the forcible contractions of the renal pelvis in its effort to expel the stone which due to its raw surface and accidental change of position irritated the lining of the pelvis. The

The statistic experience that practically all the concretions found in the ureters are of renal origin strengthens further the above-mentioned conclusion. The reappearance of an attack in

within the ureteral lumen third it must be shown that the consistency of this foreign body is that of a urinary calculus

That an obstruction is present is strongly suggested if the ureteral sound is arrested at the same point several times during a single seance This suggestion becomes a certainty if a metallic click is heard when the sound impinges on the obstruction The metallic click is rendered plainly audible by the attachment of a resounding disk to the distal end of the sound The use of a wax tipped catheter has been suggested for the discovery of ureteral stones the argument being that scratches on this impressionable substance will prove the presence of a concretion Divisions on this catheter are marked off by alternating black and red segments 1 cm in length and these are intended to place accurately the exact location of the calculus But these calculations are subject to certain exceptions For example a calculus may be covered with débris to such an extent that a wax tipped catheter in reaching it may not be scratched at all or a stone resting in a sacculation of the ureter may permit the tip to pass by without touching it On the other hand the wax tip may sustain scratches while passing through the cystoscope which likewise may give misleading information

As to shadows appearing in the roentgenogram in the ureteral region it may be said that shadows of very regular outline probably are due to phleboliths or calcified lymphatics while those cast by ureteral stones are usually oblong and present an irregular outline Plates taken at different times and showing change in location of shadow point to the presence of intra ureteral concretions To further insure oneself that he is dealing with an intra ureteral shadow the following technic may be carried out At the time of the first introduction of the shadow graph catheter a small quantity of some contrast fluid—collargol silver iodid or thorium—is permitted to flow in slowly through the catheter into the ureter The catheter is then withdrawn and another x ray plate is made after the lapse of forty-eight hours During this time the urinary flow will have washed the contrast fluid out of the ureter while in the event of a urinary calculus particles of the contrast fluid will become

those stones of excessive size, or instances in which the calculus becomes impacted inside of the vesical end of the ureter

When one considers that the exposing of the ureter in its abdominal course is always a preliminary operation of great dignity, that denuding the ureter in any great length implies the danger of necrosis of its wall, that subsequent to the ureterotomy adhesions may be formed, which may lead to a permanent kinking of this tube, and that in quite a number of cases permanent ureteral fistulae may result, the conclusion will force itself into the foreground that ureterotomy is to be reserved for the most urgent cases. It is necessary to be absolutely certain of the diagnosis and location of the stone, the latter in order to avoid unnecessarily extensive denudation of the ureter, therefore the operation must follow promptly the taking of a decisive x-ray picture, because ureteral concretions may change their location very quickly and unexpectedly. Only if repeated attempts at dislodging the stone by endoscopic methods have failed and if the kidney becomes tender and the quality of the urine deteriorates, or if reflex anuria sets in, or if the size of the stone makes endoscopic delivery impossible, ureterotomy *continuante* should be resorted to.

In case the ureteral concretion becomes impacted inside of the intramural (vesical) part of the ureter the indications will vary according to the peculiar features of the case. If the calculus already protrudes partially into the bladder it may be delivered by using an alligator forceps through an operating cystoscope. If the constriction around the stone be too tight it may be relieved by the use of scissors used through this same instrument. If the concretion should be too large for endoscopic manipulations or if they should by chance fail the bladder is opened and the stone readily removed. Cystotomy represents an interference of minor importance and the surgical risk may be further reduced by the employment of local anesthesia.

The direct clinical diagnosis of ureteral stone is based on several essential points first, one must demonstrate that a partial or total obstruction of the ureter is present, second one must show that this obstruction is caused by a foreign body

CLINIC OF DR. FRANK SMITHIES

AUGUSTANA HOSPITAL

CASES ILLUSTRATING DISEASE OF THE GALL-BLADDER AND THE CONSIDERATION OF 1000 CASES OF GALL-BLADDER DISEASE

PART I

Case 1. Acute Catarhal Cholecystitis in a Young Girl, with Subsidence of Primary Attack and Later Operative Interference for Chronic Catarhal Cholecystitis ("Strawberry Gall-bladder").

Case 2 Long-continued Stomach Trouble Intermittent in Character, Later Constant and Complicated by an Acute Crisis Associated with Chill, Fever, Sweat, and Jaundice Pathologically, Cholelithiasis, Empyema of the Gall-bladder with Gangrene.

Case 3. A Young Adult Female in Whom Tonsillitis and Abscesses About Canous Teeth were Rapidly Followed by Dyspeptic and Mild Gall-bladder Distress Pathologically, Marked Cholecystitis with Cholelithiasis

Case 4 An Adult Male with a Two-year History of Intermittent "Stomach Trouble" of Ulcer Type, Terminating with Duodenal Stenosis Pathologically, Cholecystitis, Adhesions to Duodenum, Protected Perforation of Large Gall-stone into Duodenum, Duodenal Ulcer.

Case 5. A Six Weeks' History of Dyspepsia Associated with Pyloric Obstruction, Weight Loss, Cachexia, and Right Upper Quadrant Tumor. Pathologically, Carcinoma of the Gall-bladder, Cholelithiasis, Secondary Involvement of Stomach and Colon.

Case 6 A Patient Appearing with Rapidly Enlarging Lower Abdominal Tumor. Pathologically, Ovarian Cyst and Large, Thick-walled Gall-bladder Containing Many Stones

PART II

Clinical Consideration of Gall-bladder Disease Based Upon an Analysis of 1000 Pathologically Demonstrated Instances of the Affection.

PART I

EIGHT years ago MacCarty¹ demonstrated, pathologically, that gall-bladder disease is a form of inflammatory tissue reaction similar in every way to such tissue reaction in other hollow abdominal viscera. Six years later Rosenow² showed the frequent bacterial etiology of such inflammation He appeared to prove

deposited on the surface and make its outline very much more distinct in the second x ray plate.

The diagnosis of calculus impacted in the intramural part of the ureter offers no great difficulty. The information derived from a complete x ray examination may be augmented by cystoscopic investigation. If the beek of the cystoscope is pushed far into the fundus of the bladder the intramural part of the bladder is transilluminated and the concretion will then appear as a dark shadow within an area of light, bright red. A stone that partially protrudes into the viscous is easily recognized and any possible doubt may be cleared by introducing a sound through the channel of the cystoscope and touching the suspected body with the sound.

The relationship of progressive infection of the gall bladder, whether such infection be acutely and continuously progressive or chronically, continuously progressive, or chronically and intermittently progressive, with respect to its effect upon the tissues forming the gall bladder, the contents of the gall bladder and the mechanical function of the viscus are observations which require broader circulation than has yet been given to them.

The cases presented here briefly attempt to show the relationship of inflammatory affections of the gall bladder with regard to clinical symptomatology and associated pathologic changes in the gall bladder.

Case I. Acute Catarrhal Cholecystitis in a Young Girl, with Subsidence of Primary Attack and Later Operative Interference for Chronic Catarrhal Cholecystitis ("Strawberry Gall-bladder")

This patient, a young nurse aged twenty six, appeared for examination about four months since. At that time, following an attack of la grippe there had occurred sudden severe, cramp like pains in the right upper abdominal quadrant. Temperature rose to 99.5° F. but there were no chill, sweat or jaundice. The urine was normally colored. Within a few hours following the pain there was pronounced nausea followed by frequent vomiting of yellowish green fluid. The bowels were constipated. The abdominal examination revealed tenderness along the right rib edge, but was otherwise normal.

By rest in bed, rectal feeding, gastric lavage with hot salt solution, and an ice coil locally to the right upper quadrant the attack subsided within three days and the patient was permitted to return to duty inasmuch as she looked and felt entirely well. It is not uncommon in practice to term these attacks "acute indigestion."

Two weeks ago this patient experienced a drawing or dragging sensation in the upper right abdominal quadrant, and this distress has been constant. At times the distress has been punctuated by sharp, colic like pain without any area of transmission. There have been much gaseous distention in the epigastrium and a feeling of crowding about the heart violent belching at times.

that bacteria are commonly first carried to the gall bladder by way of the blood-stream, and that when such are found in the contents of the gall bladder they have been cast off from the wall of the viscus as inflammatory by products. Recently, from the surgical viewpoint, Fowler³ has emphasized the progressive, inflammatory features of gall bladder ailments, and with a similar conception, Cheney⁴ has studied 56 cases.

It is unfortunate that the above mentioned facts that have been established by bacteriologists and which have occasionally been emphasized by clinicians have not as yet received proper recognition from practitioners in general or even internists and surgeons of large hospital experience.

It is common in this clinic as it is in others to have instances of gall bladder disease brought for examination or treatment with diagnoses not rarely professionally given of "dyspepsia," "indigestion," hyperchlorhydria or peptic ulcer. It is by no means uncommon to have such patients give histories of long continued courses of treatment directed toward the relief of anomalies supposed to be primary in the stomach. Many such patients have had various types of medical ulcer cure only to eventually be demonstrated at laparotomy and later pathologically as instances of long-standing gall bladder disease. This is especially the case in individuals below the age of thirty years, in whom it is common practice to ascribe any digestive upset associated with the symptom of hyperchlorhydria as being due to peptic ulcer. It has not as yet become generally disseminated knowledge that true peptic ulcer is a rare finding at laparotomy or autopsy in individuals below the age of thirty nor has it been sufficiently emphasized that in the young especially so-called hyperchlorhydria symptoms do not of necessity mean increased acid in the stomach. Abundant evidence at hand establishes the fact that many symptoms of so-called "hyperacidity" are merely manifestations of abnormal motor activity on the part of the stomach—pyloric spasm, gastric spasm, spasm at the cardia, or the regurgitation of normally acid gastric contents into an esophagus accustomed to harbor material that is alkaline or, at the outside, neutral in reaction.

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some nausea, but vomiting only once. The vomitus was greenish yellow and small in amount. The bowels have been constipated, the appetite poor.

The abdominal examination when the patient was first seen revealed nothing abnormal other than tenderness along the right rib edge, dulness on percussion over the theoretic gall bladder zone, and gaseous distention of the cecum and ascending colon. The stomach showed no retention, free HCl was 30 the total 46 the x-ray plate negative, stools contained hydrobilirubin and there was no bile present in the urine. The white count was 11,000 of which 76 per cent were polymorphs.

On account of this patient's constant distress and the interference with her occupation and in view of the past history and present local findings, exploratory laparotomy was advised.

Laparotomy disclosed a greatly distended gall bladder, 250 cc. of thick, brown mucoid bile containing much granular material being drawn off through a trocar. The walls of the gall bladder were edematous, the mucous membrane thickened and presenting a strawberry red appearance. The lymph-nodes along the common bile-duct were greatly enlarged and there were found adhesions between the gall bladder and the duodenum. The appendix was chronically inflamed. Cholecystectomy and appendectomy were performed.

The above case would appear to emphasize the relationship of a gradual infection toward the production of a cholecystitis, the subsidence of the acute infection but the steady onward progress of the inflammatory changes so that within a few months mechanical interference to the free emptying of the gall bladder involvement along the common duct and the fine adhesions between the gall-bladder and the duodenum are tangible evidences of the invasion of infection into surrounding structures.

Case 2 Long-continued Stomach Trouble Intermittent in Character, Later Constant and Complicated by an Acute Crisis Associated with Chill, Fever, Sweat, and Jaundice Pathologically, Cholelithiasis, Empyema of the Gall bladder with Gangrene

This second patient, a married woman aged thirty four, who has borne two children and in the past has been affected with measles, smallpox, and pneumonia, was apparently well until ten years ago. She then experienced attacks of stomach trouble coming on several times a year. These attacks would last from a day to a week or so. In the attack the patient experienced nausea, pain in the epigastrum, gaseous distention, and would occasionally vomit. The epigastric distress never amounted to severe pain. It was usually relieved by hot applications, limitation of food, and emptying the bowels.

Two years ago the patient experienced a sharp, stabbing pain along the right rib edge. The pain radiated through to the back, came on suddenly, and required morphin for its relief. There were no vomiting, chill, fever, sweat, or jaundice. These attacks have been very frequent since that time, and have come on once every three to five weeks. Two months ago there was an especially severe attack, accompanied by vomiting of very sour fluid and possibly a slight icteric tint to the sclera. The attack was relieved by initial doses of morphin, followed by fasting and catharsis. Since the last severe attack there have been sour eructations immediately after eating, epigastric burning and some nausea. The distress has been relieved by frequent doses of bicarbonate of soda.

Just before entering the hospital a week ago, shortly following the evening meal, there were rather pronounced right upper quadrant distress but not nearly so severe as had been previously experienced, some retching, but no vomiting and a feeling of "being sick all over". The patient was brought to the hospital and the temperature found to be 102.4° F and leukocytes 18,000 of which 86 per cent were polynuclears. There was right upper quadrant distention, spasm of the right rectus, dulness to percussion over the right upper quadrant, and gaseous distention of the colon. There was no jaundice the stools contained bile-pigment and the urine was free from bile coloring.

Laparotomy (which appeared to be urgent on account of previous attacks, suddenly developing temperature, with leukocytosis and the right upper quadrant distention, with marked spasm of the rectus margin) disclosed a greatly distended gall bladder, fiery red in color, with large, inflamed glands about the cystic and common ducts. At aspiration nearly a liter of foul smelling pus flowed from the gall bladder. The mucosa of the gall bladder was gangrenous in patches, and toward the cystic duct lay two large gall-stones. A portion of the gall bladder was attached to the liver, and at this point gangrene had occurred, with resultant small localized abscess in the liver.

This case would appear to emphasize the possibility of long continued gall bladder infection becoming complicated by gall stones, with resultant interference of free emptying of the gall bladder, diminution in gall bladder resistance, and an acute lighting up of infection in the gall bladder wall, with rapid tissue destruction, gall bladder distention, and threatened rupture. The inflammatory exudate from the gall bladder wall and the presence of rapidly progressing virulent infection quickly accumulated, with concomitant systemic manifestations of infection. Emphasis should be placed upon the few severe symptoms arising at the time when the most marked pathologic changes were occurring in the gall bladder.

Case 3 A Young Adult Female in Whom Tonsillitis and Abscesses About Canine Teeth were Rapidly Followed by Dyspeptic and Mild Gall-bladder Distress. Pathologically, Marked Catarrhal Cholecystitis with Cholelithiasis.

This young unmarried girl aged twenty-one was in perfect health until three months ago. At that time she consulted a physician on account of an acute tonsillitis. A month since, the acute affection having subsided the tonsils were removed. At the time of tonsillectomy several decayed teeth were observed, and radiograms showed abscesses about one lower molar, one upper canine, and two upper incisors. Three weeks since the patient began to experience pain in the left ear, the throat and the right epigastrium. The neck and throat pains were neuralgic or rheumatoid in character, while the abdominal distress was a

dull aching sensation, with occasional sharp, colicky twinges. The distress was most marked immediately after eating and at night after getting to bed. There were nausea (almost constant), but never vomiting, anorexia, belching of gas and occasional regurgitation of food. The bowels were constipated.

At the time of entering the hospital the physical examination showed nothing abnormal except mild secondary anemia, enlarged cervical lymph nodes, moderate gaseous distention of cecum and ascending colon and pain on deep pressure in the region of the gall bladder. This tender area was dull to percussion but on Roentgen examination revealed no atypical shadows. The urine contained no bile coloring the feces were normal in consistency, and gave positive test for hydrobilirubin by the Schmidt bichlorid technic. The patient's persistent nausea, anorexia, epigastric distress and general weakness, taken in association with the history of the development of the digestive upset, determined treatment by laparotomy.

At *laparotomy* a gall bladder very edematous thickened, and adherent was demonstrated. On opening the gall bladder one large cholesterol stone (2 cm in diameter) numerous small yellow cholesterol stones varying in size from a millet seed to a split pea were present. The mucosa of the gall bladder was congested granular in appearance and the lymph nodes along the common duct were greatly enlarged. The gall bladder was removed, and at the same time several of the decayed teeth were extracted. Cultures from the teeth the gall bladder wall and the small cholesterol stones revealed streptococci apparently of similar type.

By the above case it would appear that we have an instance of rapidly developing gall bladder wall infection secondary changes in the gall bladder contents with alteration in the bile and the early formation of gall stones. From the history of absence of abdominal complaint and dyspeptic upset previous to the acute tonsillitis it would seem that the throat infection maintained a significant etiologic relationship toward the gall bladder disease. The presence of abscesses about teeth roots and the finding of a culturally similar streptococci in the exudate about

the teeth in the gall bladder wall and in the small gall-stones would apparently substantiate this view of the cause of the gall bladder disturbance.

Case 4 An Adult Male with a Two-year History of Intermittent "Stomach Trouble" of Ulcer Type Terminating with Duodenal Stenosis. Pathologically, Cholecystitis Adhesions to Duodenum, Protected Perforation of Large Gall-stone into Duodenum, Duodenal Ulcer.

This patient, a farmer aged thirty-eight claims to have been in perfect health and free from any contagious or infectious ailment until two years since. At that time he experienced a dyspeptic disturbance. It was intermittent in character, the periods of discomfort occurring every three weeks to two months. At the time of the dyspeptic upset there was epigastric distress sometimes gnawing or burning never severe enough to be called actual pain or colicky. The distress appeared from one to three hours following food intake and was promptly and constantly relieved by the ingestion of food. The disturbance appeared more pronounced in the spring of the year. During the past four months the distress has been more or less constant. About six weeks ago there was sharp sudden pain in the pit of the stomach the pain required morphin for relief, and radiated straight through to the back. Following this sudden severe pain there was diarrhea for four days and within two weeks a constant dyspepsia arose characterized by vomiting four to six hours after eating or at night (the vomitus frequently being of the retention type) nausea sour eructations belching of gas anorexia constipation and persistent but gradual weight loss.

Physical examination at the time of entry showed a well developed male in fair condition of nourishment, there was no anomaly of pulse temperature or respiration the sclera were not jaundiced there were several infected teeth roots and moderately large infected tonsils. The abdominal examination was negative with the exception of spasticity of the right rectus muscle and slight tenderness on deep palpation in the right upper abdominal quadrant.

The hemoglobin was 75 per cent. white count 9000 Wassermann negative.

The test meal revealed persistent twelve-hour food retention. The free HCl 30, the total acidity 84. Test for blood and bile in the gastric extracts were negative. Microscopically, there was a great excess of actively budding yeasts and many bacilli of the colon group.

The stool contained small amounts of undigested food, especially meat fibers, the benzidin test was persistently positive. Hydrobilirubin was present by the Schmidt test.

The Roentgen examination disclosed partial pyloric and duodenal obstruction, fixation of the duodenum, and secondary dilatation of the stomach. The gastric emptying power was retarded so that the stomach held barium mixture longer than twenty four hours.

At *laparotomy* a dense mass of adhesions formed a tumor the size of a small grape-fruit, binding tightly together the gall bladder, the liver, the pyloric end of the stomach, duodenum, and the pancreas. The gall bladder was thickened, very vascular, and at the point where it was most closely adherent to the duodenum had perforated into the duodenum, with resultant duodenal ulcer. A large gall stone was embedded in the adhesion at the edge of the point of fistula between the gall bladder and duodenum.

The duodenal ulcer extended into the head of the pancreas. The gall bladder, ulcerated portion of the duodenum, and the pyloric sixth of the stomach were removed by Dr. Nelson Percy and gastrojejunostomy performed. The patient made an uneventful recovery.

In the above case, chronic focal infections about the mouth and throat would seemingly present an etiologic foundation for a slowly developing gall bladder malfunction. It would seem from the history and *laparotomy* findings that the advance of disease in the gall bladder had been extremely gradual and without symptoms until fistula between the gall bladder and the duodenum occurred. While it is impossible to state that the duodenal ulcer did not become adherent to the gall bladder and the ulcer perforate into the gall bladder with secondary liberation of the large gall stone, it would seem more likely that the chron-

ically inflamed gall bladder containing the stone became adherent to the duodenum, and that this resulted in disturbance of duodenal function with formation of ulcer either as a consequence of this disturbance or due to the actual perforation of the stone into the duodenum. The case further emphasizes how impossible it is from clinical history alone to determine in a patient presenting even clean-cut ulcer symptomatology that the ulcer judged to be present from clinical course represents all of the pathology that may be revealed at laparotomy. This case also furnishes a significant hint regarding the limitation of so-called medical ulcer cure with respect to the halting of pathologic changes occurring in the duodenum or in neighboring structures.

Case 5 A Six Weeks' History of Dyspepsia Associated with Pyloric Obstruction, Weight Loss, Cachexia, and Right Upper Quadrant Tumor Pathologically, Carcinoma of the Gall-bladder, Cholelithiasis, Secondary Involvement of Stomach and Colon.

This woman, aged fifty-six, married, and having given birth to ten children, was entirely well until eight years since, at which time she had a laparotomy for an acute appendicitis. There was good recovery.

Six weeks ago, without any apparent cause, the patient vomited partly digested food a half hour after eating. Since that time has had constant nausea, the smell of cooking particularly aggravating the nausea, she has vomited daily, usually after the evening meal, and the vomitus has been of the retention type.

There have been upper epigastric distress without definite pain, a feeling of pressure beneath the liver and the heart, constipation, weakness, and a loss in weight of about 20 pounds during the past two or three months.

At the time of entry the patient appeared moderately well nourished but rather pale, there was a small fetal adenoma of the thyroid isthmus, a well-compensated mitral regurgitation and, upon abdominal examination, a firm, well-defined, hard not tender, deeply fixed mass was demonstrated in the right upper quadrant. The edge of the liver was palpable and irregular.

The test meal showed twelve-hour retention, an excess of mucus, free hydrochloric acid absent, total acidity of 32, positive

benzidin test, and, microscopically, food remnants, yeasts, and a few long bacilli of the Boas Oppler group

The stool contained hydrobilirubin by the Schmidt test and definite amounts of altered blood by benzidin test

The x ray examination disclosed pyloric obstruction and a filling defect due to tumor involving part of the antrum, the pylorus, and obliterating the duodenum. There were fixation of the pylorus and secondary dilatation of the stomach. Exploratory laparotomy appeared the only course of procedure.

At *laparotomy* a huge, cancerous mass, apparently arising from the gall bladder, secondarily invaded the duodenum, the pylorus, the head of the pancreas, and the liver. In the cancerous gall bladder were found several cholesterol and calcium stones. Anterior gastro-enterostomy was performed with pylorectomy and cholecystectomy.

The above case emphasizes the possibility of long continued gall bladder disease associated with gall stones and later a development of extensive malignancy. The entire pathologic gamut, from acute simple inflammation to exuberant malignant hyperplasia progressed with no noticeable symptoms until the tumor mass invaded digestion viscera. The secondary invasion of hollow viscera rapidly resulted in obstruction to the onward progress of food. This mechanical anomaly led the patient to seek medical advice and offered opportunity for a study of the cause of the digestive upset.

Case 6 A Patient Appearing with Rapidly Enlarging Lower Abdominal Tumor Pathologically, Ovarian Cyst and Large, Thick walled Gall-bladder Containing Many Stones

This woman aged fifty years with a previous negative history, seeks relief for a rapidly developing abdominal tumor as associated with weight loss, nausea, constipation and dysuria. The tumor became noticeable to the patient about two months since, and has increased in size very rapidly during the past three weeks. There have been no symptoms other than those above enumerated.

Upon entry the physical examination revealed a somewhat cachectic female whose abdomen presented a globular swelling

ically inflamed gall bladder containing the stone became adherent to the duodenum and that this resulted in disturbance of duodenal function with formation of ulcer either as a consequence of this disturbance or due to the actual perforation of the stone into the duodenum. The case further emphasizes how impossible it is from clinical history alone to determine in a patient presenting even clean-cut ulcer symptomatology that the ulcer judged to be present from clinical course represents all of the pathology that may be revealed at laparotomy. This case also furnishes a significant hint regarding the limitation of so-called medical ulcer cure with respect to the halting of pathologic changes occurring in the duodenum or in neighboring structures.

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There have been upper epigastric distress without definite pain a feeling of pressure beneath the liver and the heart constipation weakness and a loss in weight of about 20 pounds during the past two or three months.

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The test meal showed twelve hour retention an excess of mucus free hydrochloric acid absent total acidity of 32 positive.

average age was for females 41.9 years and for males 44.5 years. It would thus appear that gall bladder disease is evidenced rather later in life in males than in females.

The minimum age was in females thirteen years and in males fifteen years. In both these instances cholecystitis was complicated by cholelithiasis.

The maximum age was seventy six years for each sex. In the female patient there was a thick gray fibrous gall bladder containing 26 large brown faceted stones one of which lay in the cystic duct. In the male there was found a very tense, enlarged and adherent gall bladder stone free.

TABLE I
SEX AND GALL-BLADDER DISEASE

| | | |
|--------|--|-----------|
| Female | | 672 cases |
| Males | | 328 |

(Ratio—Females to Males as 2.05 : 1)

AGE IN RELATION TO GALL-BLADDER DISEASE

| Age | Females | |
|----------------|---------|-----------|
| | No. | Per cent. |
| Under 20 years | 12 | 1.8 |
| 20 to 30 | 118 | 17.6 |
| 30 to 40 | 169 | 25.2 |
| 40 to 50 | 183 | 27.2 |
| 50 to 60 | 121 | 18.0 |
| 60 to 70 | 60 | 8.9 |
| Over 70 | 9 | 1.3 |
| Minimum age | | 13 years |
| Maximum age | | 76 |

| Age | Males | |
|--------------------|-------|-------------|
| | No. | Per cent. |
| Under 20 years | 2 | 0.6 |
| 20 to 30 | 41 | 12.5 |
| 30 to 40 | 75 | 22.9 |
| 40 to 50 | 85 | 25.9 |
| 50 to 60 | 85 | 25.9 |
| 60 to 70 | 34 | 10.3 |
| Over 70 | 6 | 1.8 |
| Minimum age | | 15 years |
| Maximum age | | 76 " |
| Average female age | | 41.85 years |
| Ave age male age | | 44.52 |

in the lower epigastrium extending above the navel. The swelling was the size of a distended football, and upon palpation seemed movable, elastic, and filled with fluid. On bimanual vaginal examination, the tumor appeared to be connected with the right ovary and manifested characteristics of ovarian cyst.

At *laparotomy* a large ovarian cyst of the simple type was demonstrated, and during the general abdominal exploration a large, thick, adherent distended gall bladder filled with many impacted stones was demonstrated. The gall bladder and the cystic tumor were removed.

The above patient illustrates very forcibly the facts that slowly progressing long-continued gall bladder inflammatory changes, associated with stone production, may be present apparently for a long time without giving rise to such clinical symptoms as are commonly associated with gall-stones and with gall-bladder disease. Only the accidental development of another type of abdominal complaint leads to laparotomy, at which time the marked gall bladder changes are discovered.

The wide variation in symptomatology, etiology, and pathologic changes occurring in gall bladder disease is abundantly emphasized by the cases here presented. It would appear opportune at this time to review the series of patients affected with gall bladder disease that I have recently classified.

PART II

CLINICAL CONSIDERATION OF GALL-BLADDER DISEASE BASED UPON AN ANALYSIS OF 1000 PATHOLOGICALLY DEMONSTRATED INSTANCES OF THE AFFECTION

My report attempts to set forth certain useful facts that have become evident from an analysis of 1000 consecutive, operatively demonstrated instances of gall bladder disease. The records and pathologic reports are those of hospital patients. They have been accumulated during the past five and a half years.

General Consideration.—1. Sex—There were 672 female and 328 male patients—a rather more than twice as many females as males (ratio 2.05:1).

2. Age—The average age for the series was 43.2 years. The

TABLE II

SHOWING THE RELATIONSHIP OF BACTEREMIAS SEPTICEMIAS OR CHRONIC LYMPHATIC INFECTIONS TO GALL BLADDER DISEASE

| Disease. | Cases | Per cent. |
|---------------------|-------|-----------|
| Typhoid fever | 206 | 20.6 |
| Measles | 180 | 18.0 |
| Chronic tonsillitis | 146 | 14.6 |
| Scarlet fever | 145 | 14.5 |
| Pneumonia | 115 | 11.5 |
| Infected teeth | 93 | 9.3 |
| Chronic rheumatism | 92 | 9.2 |
| Malaria | 87 | 8.7 |
| Whooping-cough | 75 | 7.5 |
| La grippe | 66 | 6.6 |
| Mumps | 62 | 6.2 |
| Diphtheria | 47 | 4.7 |
| Chicken pox | 47 | 4.7 |
| Chronic sore throat | 46 | 4.6 |
| Chronic bronchitis | 20 | 2.0 |

Table II presents significant information with respect to infectious ailments and gall bladder disease. It is apparent that while typhoid fever is the most common febrile or infectious disorder associated with gall bladder affections, yet, well toward the top of the list, are many so called "children's diseases." Particularly prominent are those ailments which present characteristics of bacteremias or of low grade, persistent or recurrent infections of lymphatic tissue. In many of these ailments streptococci, diphtheroid bacilli and micrococci are fairly constant findings. Their importance with relation to concomitant or future gall bladder disease is emphasized when it is recalled that the experimental investigations of Rosenow have seemingly demonstrated a peculiar affinity of organisms of the coccus group for the walls of the alimentary tract particularly that of the gall bladder. These bacteria are quite commonly found in the gall bladder mucosa, in bile, and in the interior of gall stones, in fact, they would appear to occur more frequently than do organisms of any other type, not excluding *Bacillus typhosus* or *B. coli*. It is therefore, evident, how important, etiologically, the history of such ailments as measles, scarlet fever, tonsillitis, "rheumatism," whooping-cough, la grippe, mumps, diphtheria,

Table I emphasizes that in females rather more than 70 per cent of instances of gall bladder disease occurred between thirty to sixty years while in males nearly 75 per cent of cases fell in a like period. Practically the same number of cases were demonstrated in each sex between twenty to sixty years (88 per cent).

3 Hereditary Disease—From 90 patients (9 per cent) there was obtained reliable information respecting the appearance of malignant disease in blood relatives. It is interesting to note that there was an hereditary history of cancer in but one of the neoplastic gall bladders of the series.

A family history of gall stones was obtained from 10 patients (1 per cent).

4 Operative Procedures Previous to Coming Under Observation—From 84 patients (84 per cent) the appendices had been removed in 23 cases (23 per cent) cholecystostomy had been performed while 7 patients had been cholecystectomized (07 per cent.) Upon 48 patients (48 per cent) pelvic operations had been done either for the correction of real malformations or to relieve reflex dyspepsias. Five patients had been gastro-enterostomized in the attempt to cure existing or suspected peptic ulcers. In none of these cases had the gall tract been surgically treated.

5 Previous Infectious Diseases—Only information of relative accuracy can be presented. In numerous histories all illnesses occurring from birth to young adult life are summed up by the vague term children's diseases. Such a phrase never should be permitted in any history unless definitely qualified. Recent bacteriologic and pathologic advances have taught that many ailments common to the early years of life are responsible for serious local or systemic damage in later years. This is particularly true of the acute exanthemata and of inflammations of lymphoid tissue.

pendix and gall bladder disease has been frequently commented upon MacCarty¹ found definite gross and microscopic appendix lesions in 69 per cent of 59 patients operated upon for gall bladder affections. In my series 84 patients (8.4 per cent) had had their appendices removed before coming under observation for the gall bladder ailment. At the laparotomy for the latter in 682 cases (68.2 per cent) there was sufficient pathology to warrant appendicectomy. Combining the two observations it would seem that of 1000 instances of gall bladder disease in 766 patients or rather more than 3 out of 4 the appendix was also abnormal. In many patients the histories indicated appendiceal disturbances before gall bladder function was so sufficiently impaired as to give rise to definite symptoms.

TABLE III
SUMMARY OF FINDINGS AT LAPAROTOMY

| | | |
|---|-----|------------------------|
| Cholecystitis with stones in | 509 | cases or 50.9 per cent |
| Cholecystitis with sandy bile in | 46 | 4.6 |
| Carcinoma { with stones in 16 } without stones in 7 } | 23 | 2.3 |
| Cholecystitis without stones in | 430 | 43.0 |
|
ASSOCIATED LESIONS | | |
| Appendix disease | 682 | 68.2 |
| Gastric ulcer | 43 | 4.3 |
| Duodenal ulcer | 37 | 3.7 |
| Gastric cancer | 14 | 1.4 |
| Pancreatitis { Acute 2 } Chronic 63 } | 65 | 6.5 |
| Enlarged lymph-glands { Non malignant | 124 | 12.4 |
| Malignant | 11 | 1.1 |
| Total | 135 | 13.5 |
| Liver enlarged | 73 | 7.3 |

Table III details valuable information with regard to other lesions associated with gall bladder pathology. Evidences of the actively progressive infective nature of gall bladder disease are abundantly demonstrated by the observation of enlarged lymphatic glands in 124 cases (12.4 per cent) chronic pancreatitis with enlargement in 63 cases (6.3 per cent) acute pancreatitis with hemorrhage and fat necrosis in 2 cases and enlarged

etc., may become with respect to digestive anomalies, whether the upset occurs at the time of the acute, infectious ailment or at some future date. The demonstration, at physical examination, of infected gums, head sinuses, maxillæ, joints, tonsils and superficial lymph gland chains further emphasizes a probable causative agent in the production of alimentary tract disturbances. There were 112 patients (11.2 per cent.) in the series in whom acute infectious ailments seemed to be directly responsible for the initial evidences of gall bladder disease or for exciting to activity processes previously quiescent.

In some way *pregnancy* or *childbirth* appear to affect gall bladder function. A definite relationship was manifested by 65 of our cases (6.5 per cent.). In such a physiologic state a demand for increased activity from the liver, gall bladder, and the alimentary tract may be sufficient to disturb even the *normal* biliary mechanism. If demand for excessive function be made upon a gall tract already the seat of disease (as a low-grade infection) it would appear reasonable to expect bacterial proliferation and inflammatory change, permissible as a consequence of lessened local tissue defense.

Laparotomy Findings—1 Of the series of 1000 cases, non malignant cholecystitis associated with calculi was demonstrated in 509 patients (50.9 per cent.). In 46 patients (4.6 per cent.) the inflamed gall bladder contained altered bile mixed with sand like substance. Twenty three (2.3 per cent.) were affected with malignant disease of the gall bladder and in 16 patients of this group (69+ per cent.) gall stones were present. In the remaining 7 cases it was not possible to prove the previous presence of stones, although in 4 cases the early histories suggested them.

There were 430 cases of cholecystitis (43 per cent.), in which neither gall-stones "sand" nor malignancy were demonstrable. These gall bladders all exhibited definite evidences of

at the mortality of 5.9 per cent.

2 Associated Lesions—The concomitant incidence of ap-

have as their nuclei agglutinated bacteria, precipitated mucus, or cellular *débris*. There is usually an excessive secretion of cholesterol.

In our series there were 228 cases (23.2 per cent) of acute or subacute catarrhal cholecystitis. Stones complicated in 51 per cent, "sand" in 8 per cent. Many of these gall bladders would undoubtedly have remained untouched had not the history of frequent infections and of dyspeptic upsets, the appearance of the bile obtained upon gall bladder puncture, the presence of stones or "sand," the vascularity of the gall bladder wall, or the finding of enlarged lymph nodes along the bile ducts directed special attention to the gall bladder. Tissue cultures show that from such type of gall bladder positive growths are most commonly obtained. Bile, mucus and stone cultures also yield the highest percentage of positive growths. The organisms most commonly found are non hemolytic streptococci, colon bacilli, staphylococci, and fusiform bacilli. *Tissue culture of the gall-bladder wall may be positive*, and yet the contents of the gall bladder practically negative. There may be several organisms cultured from both wall and bile. The *enlarged lymph glands* along the bile-ducts may return organisms similar to those of the gall bladder wall and of the bile. The streptococcus appears to have a peculiar affinity for the lymphatic chain draining the gall bladder.

If no acute crisis supervenes or if there is no operative interference, "acute catarrhal cholecystitis" may progress to the chronic form—viz., *strawberry gall bladder*. Here the mucosa is most greatly affected. It is congested, strawberry red, and velvety. The apices of the villi become eroded and lose their epithelium. Consequently yellow specks dot the reddened mucosa. They represent minute bits of scar tissue where the epithelium has been destroyed. These yellow specks are frequently wrongly considered to be fine stones of "sand."

The gall bladder wall may still exhibit little gross change. There is commonly however, some edema and thickening. The thickening may in some instances be pronounced. The contents of the gall bladder may be merely thickened bile or mucus.

liver in 73 cases (7.3 per cent.) The presence of peptic ulcer (gastric and duodenal) in 80 patients (8.0 per cent.) may be more than a pathologic coincidence It certainly indicates limitations in the diagnosis and prognosis of both ailments

Pathologic Changes in the Gall-Bladder—A working knowledge of the nature and character of the pathologic changes occurring in the gall bladder would appear to be essential for a proper appreciation of the clinical manifestations for which these pathologic alterations may be responsible It is an unfortunate fact that to both the lay and the professional mind gall-bladder pathology means largely late stage affections, as gall-stones, obstruction, perforation thickening or fibrous adhesions. The average text book considers cholecystitis in a vague uncertain way, as though it were *not an ailment second in frequency of all intra-abdominal disease only to lesions of the appendix*. Commonly cholelithiasis meets recognition as an acute dramatic, abdominal crisis, in which the chief roles are played by colic, chill, fever sweat, and jaundice

The basis of gall bladder pathology is largely the reaction of four layers of tissue to infection. The infection is most commonly blood borne It is quite likely that bacteria first produce changes in the mucosa and submucosa. Such changes consist in congestion and infiltration of the villi with lymphocytes (*catarrhal cholecystitis*) *In situ* the gall bladder, grossly, to sight or touch presents no marked variation from the normal The palpating hand of the surgeon detects no abnormality Unless there has occurred excessive mucus excretion and the bile is so thickened that it is forced through the gall-ducts with difficulty, such gall-bladders are commonly pronounced 'normal,' and remain untouched Yet this type of gall bladder is seemingly the foundation type for the majority of gall bladder ailments It is also the actively infected type Indeed it most frequently furnishes the purulent, necrotic, gangrenous and perforative complications The whole gall bladder need not be involved. The fundus is quite commonly affected early and remains infected longest. The contents of the gall bladder are usually thick bile mixed with mucus. Stones or "sand" may form within a few weeks They

this distress later takes on the character of a *malignant disease*, that we can surmise that the "irritation," so called, from long-existing gall stones has contributed to the onset of cancer. If in the course of the benign ailment gall stone "colics" and signs of biliary tract obstruction are exhibited the case against calculi as instigators of malignant disease is more strongly established.

There were 23 cases of cancer of the gall bladder in my series. Gall-stones were coincident in 16 cases (69 $\frac{1}{2}$ per cent). The average duration of symptoms of 17 of the cases was rather more than six months. The remaining patients had been ill from two to thirty six years. In a case exhibiting symptoms intermittently for ten years but one medium sized stone was present.

1. Contents of the Gall bladder -- Fluid—This may vary greatly, from a few cubic centimeters of golden bile to enormous quantities of greatly altered bile. That the gall bladder has great capacity for distention is shown by one of our cases, in which nearly 4 gallons of black bile were drained from the bladder of a female, aged twenty two who had been ill but two weeks. An acute catarrhal cholecystitis with cystic duct obstruction had followed la grippe. It is characteristic of cystic duct obstruction to produce the greatest gall bladder distention. Where obstruction occurs in the common duct that duct may be greatly distended, but commonly the gall bladder is small. Stone or catarrhal obstruction of the hepatic duct may likewise result in small gall bladder.

The *physical characteristics* of the gall bladder contents are likewise influenced by the nature of the inflammatory process going on in the mucosa. Persistent inflammation produces desquamation, and later atrophy of the mucosa. Excessive amounts of mucus, bacteria, epithelial elements, and cholesterol are thrown off. The normal golden bile becomes turbid, thick mud, and often dark. It may be almost black. Pus and blood admixtures occurred in 11 per cent of our cases. If drainage remains fairly free, the altered bile may in part pass. The thickened portion may remain behind as a dark, inspissated formless paste.

Stones may occur at any stage of an infected process. They

In our series chronic catarrhal cholecystitis or "strawberry gall bladder" was present in 328 cases (33.6 per cent) Stones or "sand" complicated in 62 per cent

Should spontaneous regression of the gall bladder inflammation proceed, or the gall bladder be left undisturbed, infection may rapidly or gradually (intermittently or fairly constantly) involve the deeper layers of the wall. Edema, lymphocytic infiltration and increased vascularization may occur. Purulent, necrotic, or gangrenous changes may appear rapidly, either during the progress of an acute infection, or at the lighting up of a local focus, in a chronically infected bladder wall. The pentonal layer quickly may be involved and adhesions to neighboring viscera take place. Retrograde changes may likewise occur locally or generally. In a surprisingly short time dense scar tissue or even calcareous areas may be seen.

Our series exhibited 425 cases (43.4 per cent) of chronic cholecystitis. Stones or "sand" were associated in 91 per cent.

Primary malignant diseases of the gall bladder may be local or general.

When the affection is *local* the origin is apparently due to faulty cellular proliferation of the epithelium covering the hyperplastic villi. The stimulating agent is unknown, but the relation between chronic, low grade bacterial activity and gall-stone formation toward malignant disease of the gall bladder would seem to be quite strong.

In *general neoplastic* change the gall bladder always presents evidence pointing to long-continued inflammation *histologically* speaking. The time duration may be quite short—certainly as short as within a few months. Gall-stones may be formed during the preliminary steps leading up to the appearance of the malignant disease. The fact that calculi are often found in malignant gall bladders does not of necessity prove that such calculi caused the cancer, they may have been formed as the cancerous change altered the excretory function of the gall bladder or prevented its proper motor activity. It is only when there has been a long history of intermittent attacks of a *benign*, abdominal distress whose origin can be definitely traced to the gall tract and when

disclosed mild digestive upsets that had been classed as "dietetic," or in the presence of ailments of severe nature, had been disregarded. It is also surprising how many of the "symptomless" gall stone patients give history of acute infectious ailments jaundice years previously, or, upon close questioning recall forgotten attacks of painful type that have been passed by as "acute indigestion," "gastral-gia," "ptomain poisoning," and the like.

(a) *Type of Individual*—The opinion appears to be quite general that patients affected with gall bladder ailments are over nourished or even obese. The diagnostic dictum, particularly with regards females of "fair, fat, forty, belches gas, hence gall stones," has obtained a greater vogue than its alliterative or its pathologic accuracy warrant. Less than 8 per cent of our patients were obese or had consistently gained weight. There was weight loss in 493 cases (49.3 per cent). It ranged from 5 to 73 pounds. The greatest, most persistent weight losses were in the cancer cases. Stone and simple cholecystitis cases either maintained weight or lost it intermittently.

There were 507 cases in which there had been neither weight loss nor gain.

(b) *Belching* was prominent and distressing in 68.9 per cent. It was commonly associated with pyrosis or water brash. Nausea was annoying in 376 cases (57.6 per cent).

(c) Appetite was styled "good" in 363 cases (36.3 per cent), fair in 353 cases (35.3 per cent) and poor in 273 cases (27.3 per cent).

(d) *Bowels*—There was no anomaly in 282 patients (28.2 per cent). Constipation of an obstinate type was complained of by 612 cases (61.2 per cent). There was persistent diarrhea in 51 cases (5.1 per cent). Diarrhea alternated with constipation in 44 cases (4.4 per cent). It was noted that in the diarrhea cases at laparotomy there were generally observed swollen enlarged pancreas and lymph nodes. Persistent diarrhea was the presenting symptom in 8 of the malignant patients.

2 *Type of Ailment*—In 92 per cent of cases the gall bladder disease meant to the patient, a *dyspepsia* often of not serious nor

may require but a few weeks for their development. There were 21 cases in our series where gall bladders had been drained and then the patients reoperated within six months and where at the second operation even large stones were found in the gall-bladder remnant. *It is important that the idea should be dispelled that gall-stones mean years of gall-bladder disease.* There is abundant evidences experimentally and clinically demonstrating that two weeks to a few months are sufficient for their formation. The determining factors are mainly continuance of low-grade inflammatory changes in the gall bladder wall and defective gall-bladder emptying. A young girl in my series had a thorough drainage operation for acute cholecystitis associated with typhoid fever four weeks previously. Nearly 100 medium-sized cholesterol stones were demonstrated. A second operation was necessary within three months—the bladder was again full of stones, some of which were tightly embedded in honeycomb-like fibrous spaces in the gall bladder wall.

We have already mentioned that the nuclei of stones are commonly agglutinated though usually viable bacteria. These may be embedded in mucus, small blood-clots or cellular débris. Viable bacteria may readily be cultured from crushed gall-stones where the bile is sterile. Indeed it is seemingly true that 80 per cent of gall-stones contain viable bacteria whereas bile is actively infected in but about 20 to 30 per cent. of instances.

The gall-stones may vary greatly in size—from pinhead to as large as a chicken's egg. The conglomerate or "mulberry" stones are apt to be very large.

The number of calculi may be astonishingly great. In the instance of a female aged fifty who had had bilious attacks all her life there were by actual count 2631 stones. Larger numbers have been reported—Ochsner 6789; W Mayo "between five and six thousand" and Schachner 14,000.

Clinical Symptomatology—I. General.—There were 59 cases of gall-stones in which there were no disturbances that pointed to gall bladder upset. It is difficult to say that in these cases there had been no departure from normal health. In fact close analysis after the patient had been proved to have gall-stones usually

der, stones may coexist. Persistent jaundice usually means duct obstruction, generally the cystic or the common bile-duct. There were but 41 cases in our series in which there was persistent obstruction of the hepatic duct.

Pain—This was a characteristic symptom in 95.5 per cent. It was intermittently manifested in 688 cases (71.3 per cent). There was constant discomfort or actual pain in 211 cases (22.4 per cent).

TABLE IV

PAIN IN GALL-BLADDER DISEASE

| | Cases | Percent |
|--------------------------------|-------|---------|
| Intermittently present in | 688 | 73.1 |
| Constantly present in | 211 | 22.4 |
| Constant—later intermittent—in | 26 | 2.7 |
| Intermittent—later constant—in | 18 | 1.9 |
| No symptoms in | 59 | 5.9 |

INCIDENCE OF COLICS IN GALL-BLADDER DISEASE

| | Cases | Percent |
|---------------------|-------|---------|
| Colics exhibited in | 534 | 53.4 |
| Colics absent in | 466 | 46.6 |

STONE CASES (525)

(Including Malignancy)

| | Cases | Percent |
|---------------------|-------|---------|
| Colics exhibited in | 323 | 61.5+ |
| Colics absent in | 202 | 38.4 |

SAND CASES (46)

| | Cases | Percent |
|---------------------|-------|---------|
| Colics exhibited in | 20 | 43.5 |
| Colics absent in | 26 | 56.5 |

NON STONE CASES (430)

| | Cases | Percent |
|---------------------|-------|---------|
| Colics exhibited in | 235 | 54.6 |
| Colics absent in | 195 | 45.3+ |

In the non gall stone cases it is extremely difficult to state that just so severe pain were not manifest as in the cases where stones were present. In the non stone cases the attacks of severe pain were apparently due to small stones that had passed before laparotomy, interference with free passage of bile down the ducts is a consequence of accumulations of bacteria, cell detritus and tough mucus or a local twisting of the gall bladder, anomaly of

inconveniencing nature, but punctuated by crises of such severity as to be prostrating or decidedly inconvenient. In the remaining 8 per cent of patients the crises came without premonition or the ailment was so-called "symptomless."

There were 236 (23.6 per cent) patients who had persistent dyspepsias, 489 cases (48.9 per cent) where there was frank intermittency, but the attacks fairly frequent, and 207 cases (20.7 per cent) where the disturbance was only manifested at widely separated intervals.

3 Relation of Type of Symptoms to Pathologic Changes— Except in the cancer patients, it is not possible before laparotomy to group cases with respect either to their being simple, uncomplicated, cholecystitis, or the same associated with gall-stones. This may seem a striking and somewhat radical statement, but it is amply borne out by observations made at operation. While it is true that so-called biliary colics are rather more common in the stone cases than where stones are not present, yet in our series the percentage difference was only 7 per cent. Similar observations apply with regard to the presence or absence of evidences of obstructed bile flow. Jaundice was present in 161 cases (31.6 per cent) where gall-stones were demonstrated. Jaundice was intermittently or constantly present in more than 25 per cent of the patients in whom operated interference demonstrated no gall-stones. Of course, it was not possible to state that in the latter group of cases small stones had not previously been present and had passed before surgical interference. The point we wish to make is that it is extremely difficult even when the history of the case has been well developed where thorough physical and laboratory examinations have been made and where the intelligence of the patient is above the average, to correctly prognose before laparotomy what will be the finding when the gall bladder is actually visible and palpable. One can usually only make the diagnosis of cholecystitis, and if jaundice is persistent attacks of severe pain have constantly been associated with jaundice, such attacks have been frequent and the disease has existed for longer than six months it is safe to hazard the prognostic statement that in addition to the inflamed gall blad-

acute attacks of distress. In individuals who are chronically sick the danger of an opiate habit becoming established as a consequence of free hypodermic injections must never be forgotten.

In 90 per cent of our cases the pain was relieved by heat applied externally or administered internally in the shape of hot drinks or gastric lavage. There was *vomit relief* in rather more than 45 per cent of cases. Many more cases than these vomited but the emesis was not always accompanied by relief of symptoms. In 82 per cent there was relief of abdominal distress by *belching*. In 9 per cent relief from pain was only obtained by *alterations in posture*. Less than 7 per cent of our cases obtained relief of distress by the *ingestion of food*. In young individuals where there exists a hyperacidity syndrome this absence of relief of pain upon food ingestion furnishes an important point in the differential diagnosis between peptic ulcer and gall bladder disease. How important this is becomes evident when it is recalled that in uncomplicated peptic ulcer food relief of pain is obtained in more than 74 per cent of patients. In gall bladder disease relief of distress by the taking of *alkali* is constant in about 22 per cent of cases. Patients state that the alkali either facilitates the belching or it counteracts stomach sourness or the sensation of burning.

Characteristics of Pain—(a) *Time*—The main characteristic is that pain appears irregularly in an individual previously apparently well or it occurs constantly without any apparent definite causative factors. This applies both with respect to pain in cholecystitis and in cholecystitis associated with chole lithiasis. This is in striking contrast to the clean cut time relation factors associated with peptic ulcers where in more than 80 per cent of uncomplicated cases there is direct relationship between cause and effect—that is the pain occurs quite regularly from two to six hours following food intake. It has a characteristic form of relief namely by food ingestion alkali or vomiting. In ulcer but rarely is the pain severe enough to require the administration of opiates—in but 12 per cent of 553 operatively demonstrated instances of peptic ulcer which I recently analyzed

the neck of the bladder or a twisting, kinking or adhesive structure of the cystic duct. Such pain may be severe enough to be classed as "colic." The muscular contraction of the distended gall bladder, the walls of which are actually the seat of active infection that infection frequently being productive of a fibromyositis is not an inconsiderable factor in producing annoying distress. In a few instances large lymph nodes pressing upon the common or the cystic duct have been sufficient to account for severe paroxysmal pain.

In the stone cases, however, one of the chief distinguishing characteristics of the severe pain lies in the observation that the pain commonly ceases almost as abruptly as it develops. There is frequently a subjective sensation on the part of the patient of the pain traveling and instances are frequent enough where the affected individual will quite accurately outline the course of the common duct as the stone is progressing down the same. There is often a sudden cessation of pain and a rapid clearing up of jaundice as small stones pass through the papilla of Vater into the duodenum. The most annoying pains are those associated with impaction of small stones in the ampulla like neck of the gall bladder. An accumulation of stones at this point may obstruct the cystic duct and thereby cause clinical evidences of gall bladder distention but the duct may, in the main, remain stone free. Such cases are complicated by jaundice when there are stones also in the common or hepatic ducts. Cystic duct stones or stones in the ampulla were present in 41.6 per cent. of our stone cases. Jaundice was associated with cystic duct stone in 11.5 per cent. of cases. Such jaundice was due either to projection of the stone from the cystic into the common duct to secondary catarrhal inflammation in the common duct or to small stones that had passed into the hepatic or the common duct.

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acute attacks of distress. In individuals who are chronically sick the danger of an opiate habit becoming established as a consequence of free hypodermic injections must never be forgotten.

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(b) *Type of Pain*—The severe colics are usually described as knife-like, sticking, stabbing, piercing, doubling up or bone-like pain. The distress is probably more prostrating than is pain in any other form of digestive upset, unless it be that associated with perforation of a gastric or a duodenal ulcer. If the patient is not affected with colics his distress is usually described as a sensation of fulness, up-pressure (32 per cent.), soreness & ache, burning, and when the gall bladder disease is complicated by peptic ulcer (8 per cent. in our series), gnawing.

Location of Pain—This is usually in the right upper quadrant (74 per cent.) In numerous instances the distress is throughout the entire epigastrium (14 per cent.) Not rarely there is a widely disseminated area of discomfort, but a spot of especial distress at the right costal margin. In 4 per cent. of our cases all the pain lay in the back either at or beneath the scapulae along the spine, from the eighth to the twelfth dorsal vertebrae. Not a few patients had been undergoing osteopathic treatment for the readjustment of so-called dislocated vertebrae. Removal of the gall bladder apparently caused the vertebral articulations to become normal in an extremely short time. There were 5 cases where all of the pain lay in the right shoulder, and where the patient had been for many years treated for rheumatism and neuritis. In 3 per cent. of cases all the pain was to the left of the midline, either in the abdomen or beneath the left scapula. There were 2 patients in whom disease of the right hip-joint was suspected because more or less constant distress was present in the joint and down the right leg.

Transmission of Pain—In 32 per cent. of the whole number of cases in the series no transmission was recorded. In 23 per cent. of the stone cases there was no transmissible distress while in 41 per cent. of the instances of non-calculus cholecystitis there was no radiation of pain. Pain was most commonly transmitted into the right back or infrascapular zone (63 per cent.) In 12 per cent. the radiation was under the right ribs in 7 per cent. toward the sternum midepigastrum the left scapular or the left rib edge. In 4 per cent. of cases there was definite radiation of pain constantly to the region of the navel.

Abdominal tenderness was recorded in 883 cases. There was no abdominal tender area in 117 cases (11.7 per cent). There was dorsal tenderness (commonly along the lower thoracic or upper lumbar spines and usually to the right) in 29 (4 per cent) of 760 cases examined for such. It is often surprising how slightly tender the gall bladder may be to palpation when compared to the pathologic changes demonstrated at laparotomy.

Epigastric tumor or ridge was present in 89 cases (8.9 per cent). The liver was definitely palpable in 39 cases (3.9 per cent). There was a fluctuating tumor in 7 cases (0.7 per cent). These were instances of greatly distended, perforated, or abscessed gall bladder.

Signs of Obstructed Bile Flow—Of the entire series of 1000 cases, *jaundice* was a sign in 287 or 28.7 per cent. It was noted in 161 (31.6 per cent) cases of cholecystitis associated with stones, and in 101 (25.9 per cent) of the cases of cholecystitis where stones were present.

TABLE V

SIGNS OF OBSTRUCTED BILE FLOW IN GALL-BLADDER DISEASE

| | Jaundice | Cases | Per cent |
|--|---------------------|-------|----------|
| Absent in | | 741 | 74.1 |
| Present | intermittently in | 151 | 15.1 |
| | constantly in | 35 | 3.5 |
| | possibly in | 73 | 7.3 |
| | | | 25.9% |
| | Stools | Cases | Per cent |
| Bile present and blood absent in | | 721 | 72.4 |
| Clay-colored stools in | | 181 | 18.1 |
| Blood present in | | 26 | 2.6 |
| (Hemorrhoids in 115 cases of series—11.5 per cent) | | | |
| No symptoms in | | 59 | 5.9 |
| | Urine | Cases | Per cent |
| Bile absent in | | 810 | 81.0 |
| Bile | present in | 128 | 12.8 |
| | possibly present in | 62 | 6.2 |
| | | | 19% |
| | Gall stone Cases | Cases | Per cent |
| Jaundice | present in | 161 | 31.6 |
| | absent in | 348 | 68.4 |

The stools were "clay-colored" in 181 (18.1 per cent.) cases of the series. They contained enough bile pigment to color them sufficiently to cause no macroscopic change in 724 cases. In 26 instances (2.6 per cent.) the stools were discolored by blood, usually from hemorrhoids. In the 59 instances of gall bladder disease presenting "no symptoms" there were no stool abnormalities recorded.

Excess of *bile pigment in the urine* was observed or had been previously recorded in 190 cases (19 per cent.) of the series. In the remaining 810 cases the urine had seemingly been grossly unaltered.

In association with "colics" and evidences of obstructed bile flow, the classic triad of symptoms, "chill, fever, and sweating" were noted respectively but in 44, 54, and 36 instances.

Vomiting proved an annoying symptom in 452 cases (45.2 per cent.). Retention vomiting occurred in nearly 6 per cent. Adhesions about the duodenum or pylorus, enlarged lymph glands, pressure from distended gall bladder or liver, or in association with swollen pancreas were the cause of retention vomiting when such was of constant occurrence. Marked pyloric or gastric spasms not rarely resulted in the intermittent emesis of food that had lain in the stomach longer than twelve hours. In 62 per cent of all patients vomiting, fresh or oxydized bile was noted in the gastric contents.

Test-meals—Complete test meal records were obtained from 407 patients. In 9.2 per cent. there was some degree of twelve-hour retention. Of all the cases the average free HCl was 32.6, the average total acidity 47.9. Gastric achylia was observed in 20.9 per cent. of cases. Of 12 cancer cases where there were test meal records free HCl was constantly absent in 6. When such was combined with gastric stagnation, lactic acid was demonstrated. In cases of this type the analysis of the gastric contents so strongly resembled those from cancer patients that from this

laparotomy revealed great numbers of stones where the x-ray plate had shown but several, or where upon the plates only vague shadowy outlines of calculi or enlarged, misplaced, or malformed gall bladders were evident. In a few instances of greatly distended gall-bladder the radiogram revealed an atypically placed upper abdominal shadow that, in view of the history and the physical examination, was judged to be the gall-bladder

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Roentgen Evidence of Gall bladder Disease—In 87 consecutive instances of cholelithiasis stones were definitely or inferentially demonstrated by plates in 19 cases (21 per cent). Frequently the

CLINIC OF DR. CARI BICK

NORTH CHICAGO HOSPITAL

A NEW METHOD OF GASTROSTOMY

Say a patient presenting the absolute indications for gastrostomy conditions which the ideal gastrostomy must meet the technique

THIS patient is a gentleman who through a tumor of the larynx and pharynx has lost the possibility of breathing and swallowing through his mouth. Up to a very short time ago he was able to get along with a tracheotomy tube and was still able to swallow liquids. The treatment with x ray and radium has prevented the recurrence of his original growth but it has created such constriction by scar of the region of the pharynx and larynx that the edematous swelling of the mouth does not allow him to close his mouth or even swallow a drop of water. For the past few days he has not been able to get anything in the way of food. It is therefore a case with absolute indication for gastrostomy particularly since he is free from pain or any other symptoms of tumor.

The older methods of gastrostomy (Witzel, Kader, Senn, Frank, etc.) have been unfavorable in many instances because of leakage or obliteration. If a permanent gastrostomy is to be made it has to fulfill two indications. In the first place it must be made so that it does not leak. Second, it must be made so that it does not close spontaneously after the removal of the catheter which is put into those gastrostomies immediately after the operation.

The method which we have used here in this case as in a number of previous cases is somewhat similar to the method which Cirrel and I originally advocated for the reconstruction of the esophagus from the greater curvature of the stomach an operation which was later described by Jiuu of Bucharest about ten years ago.

CLINIC OF DR. CARL BECK

NORTH CHICAGO HOSPITAL

A NEW METHOD OF GASTROSTOMY

Summary. A patient presenting the absolute indications for gastrostomy, conditions which the ideal gastrostomy must meet, the new technic.

This patient is a gentleman who through a tumor of the larynx and pharynx has lost the possibility of breathing and swallowing through his mouth. Up to a very short time ago he was able to get along with a tracheotomy tube and was still able to swallow liquids. The treatment with x ray and radium has prevented the recurrence of his original growth but it has created such constriction by scar of the region of the pharynx and larynx that the edematous swelling of the mouth does not allow him to close his mouth or even swallow a drop of water. For the past few days he has not been able to get anything in the way of food. It is therefore a case with absolute indication for gastrostomy particularly since he is free from pain or any other symptoms of tumor.

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Fig 169.—Appearance of abdominal man after healing has occurred. Note the division in the median line and laterally, the opening in the skin above the collar bone. One may see the scar where the flap was taken to form the skin tube.

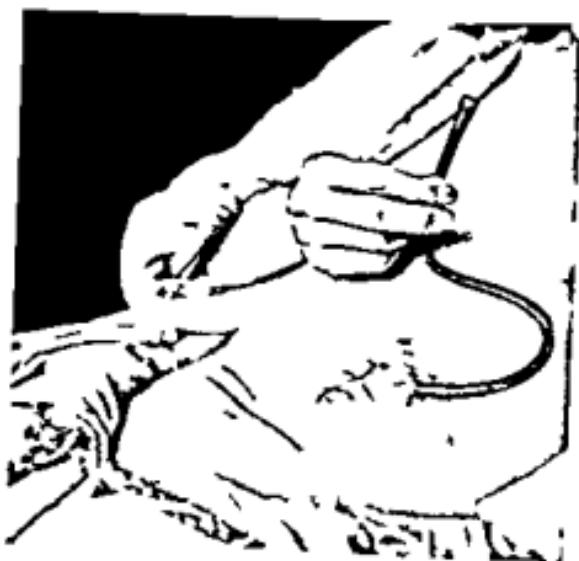


Fig 170.—A large size catheter in the tube is used at the time of nutrition of food into the stomach.

In this particular case the new esophagus is made into the shape of a narrow tube from the skin of the chest leading down

CLINIC OF DR. CARL BECK

NORTH CHICAGO HOSPITAL

A NEW METHOD OF GASTROSTOMY

Surgery. A patient presenting the absolute indications for gastrostomy conditions which the ideal gastrostomy must meet the new technic

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FIG. 169.—Appearance of abd. mus. after healing has occurred. Note the incision in the median line and laterally, the opening in the skin above the costal arch. One may see the scar where the flap was taken to form the skin tube.



FIG. 170.—A large size catheter in the tube to facilitate the intraduction of food into the stomach.

In this particular case the new esophagus is made into the shape of a narrow tube from the skin of the chest leading down

into the stomach. The method is as follows. An incision is made in the rectus muscle on the left side of the median line under local anesthesia. The stomach, as high as possible toward the cardia, is brought forward. It is grasped by a Tuffier forceps and held there in the center of the incision. Then another incision is made alongside the border of the ribs a little higher than this border, so that the opening afterward lies between the ribs.



Fig. 171.—Schematic figure of the operative technique

forming the costal arch. This incision allows a tunnel to be made from the skin down through the rectus muscle toward the stomach, and through this tunnel is brought forward the stomach in the shape of a small pouch. It is fastened with a circular row of sutures in the long median incision so that it will not slip entirely back into the abdominal cavity, and a small cone shaped tube of stomach wall runs through the tunnel toward that lateral opening. Now a flap is made from the skin of the costal

arch wide enough to form a tube. It is sutured in the shape of a tube around a large size catheter. At this moment the stomach is opened and the opening is made about the size of the caliber of the newly formed tube of skin. The catheter is passed into the stomach and the skin tube and the stomach opening are united by exact sutures. The skin tube with the catheter is now allowed to slip into that tunnel the stomach being rather prone to slip back, which will bring the junction of skin and stomach into the lower third of the tunnel. The median incision is now closed with exact sutures.

The catheter is left in place for about one week, and used for feeding. After one week there is a channel running from the opening in the costal arch region lined by skin in its upper two-thirds, by mucous membrane and stomach wall in its last third, which allows the easy and free passage of a catheter if necessary and which allows the feeding of the patient through the costal arch opening by a syringe (Figs. 169-171). It will not leak, particularly when one uses a small gauze sponge and adhesive strip to press the lips of the new opening closely together. It fulfills all the requirements of the gastrostomy; it does not close spontaneously, it does not form a stricture, and it allows the passage of a catheter and direct feeding. One can make the length of the feeding tube of skin and stomach as long as desirable.

CLINIC OF DR FREDERIC A BESLEY

COOK COUNTY HOSPITAL

SURGICAL AFFECTIONS OF THE STOMACH AND DUODENUM

Summary Presentation of 10 cases illustrating the symptoms, diagnosis and the results of treatment of gastric and duodenal ulcer and carcinoma; difficulty of differentiation between benign and malignant ulcer; recurrence of symptoms after apparent cure; cancer cachexia; pathology of gastric ulcer; etiologic relationship of cancer and ulcer; surgical indications in the presence of gastric ulceration; pyloric exclusion.

THIS morning we want to take up the surgical affections of the stomach and duodenum as we have been fortunate enough to secure a large number of cases upon which we have operated with good results. You will recognize that in dealing with this subject we will necessarily encroach upon the ground usually covered by the internist. In other words many of these cases, involving the pathology of the stomach and duodenum, are the so called borderline cases.

In considering the surgical pathology of the stomach and duodenum we are not going to take up the conditions that are surgically simple. Stab wounds and gunshot wounds of the stomach occur rather frequently, but the pathology and operative procedure are surgically simple. It merely means suture of the defect, whatever that defect may be. This narrows our field to the consideration of the surgical aspects of two general conditions, namely ulcers with their complications and tumors.

CASE I

This man presents a most interesting clinical picture. He is twenty six years of age and was operated on four months ago. His trouble began with pain in the epigastrium coming on in paroxysms about two hours before eating, then disappearing with

arch wide enough to form a tube. It is sutured in the shape of a tube around a large size catheter. At this moment the stomach is opened and the opening is made about the size of the caliber of the newly formed tube of skin. The catheter is passed into the stomach and the skin tube and the stomach opening are united by exact sutures. The skin tube with the catheter is now allowed to slip into that tunnel, the stomach being rather prone to slip back, which will bring the junction of skin and stomach into the lower third of the tunnel. The median incision is now closed with exact sutures.

The catheter is left in place for about one week, and used for feeding. After one week there is a channel running from the opening in the costal arch region, lined by skin in its upper two-thirds, by mucous membrane and stomach wall in its last third, which allows the easy and free passage of a catheter if necessary and which allows the feeding of the patient through the costal arch opening by a syringe (Figs. 169-171). It will not leak, particularly when one uses a small gauze sponge and adhesive strip to press the lips of the new opening closely together. It fulfills all the requirements of the gastrostomy; it does not close spontaneously, it does not form a stricture, and it allows the passage of a catheter and direct feeding. One can make the length of the feeding tube of skin and stomach as long as desirable.

into the category of surgical conditions or whether it belongs in the realm of internal medicine and whether it should be treated medically or should be treated surgically. You can appreciate that that is a most important question and I think the question cannot be determined without our taking into consideration the essential and underlying fact that the difficulties of diagnosis are untold and that no matter what a man's diagnostic acumen is and no matter what a man's medical or clinical experience has been he has little right to assume from any symptoms or signs that he is dealing with a gastric ulcer rather than with a gastric carcinoma or vice versa. Take this case as a case in point. Here is a man twenty six years of age with a typical history of ulcer and at operation an ulcer perforating the stomach wall was found. A carcinomatous ulcer is much less apt to perforate than an acute inflammatory ulcer. This case therefore falls into the classification of inflammatory ulcers because it did perforate. He showed a stomach analysis of gastric ulcer and yet the microscopic picture showed carcinoma and the man is back three months later with a palpable mass that is adherent to the scar.

There are certain factors in diagnosis which stand out and which should be weighed carefully when we are considering the question of whether we are dealing with an inflammatory or with a carcinomatous ulcer. The first factor in importance is the history second the physical findings third the x-ray fourth the stomach analysis. Certain of these features I hope to illustrate during the demonstration of the succeeding cases.

CASE II

The next patient I desire to present was operated on at Wesley Hospital in August 1916. This man gave a typical history of duodenal ulcer. The history was typical in this respect that he had been in the hospital before that he had been treated and had apparently recovered. I want to repeat that he *apparently recovered under medical treatment*. This man is one of the large percentage that the medical men are claiming to cure. He came back to *another* doctor two years later with the same symptom that he had before namely pain which was relieved by

the meal, only to reappear several hours after eating. This continued for about a year and a half, when the patient came to the hospital. He was operated on September 16, 1916 and was fairly well until a few weeks ago, when the pain in the epigastrium returned and has been present almost continuously ever since. He has vomited two or three times in the last week. He says the vomitus is of a yellow color. He states that he had some pain in the abdomen when he was fourteen years of age, but does not know what it was. In other words his primary symptoms began two years ago, and became progressively and consistently worse until last September when he was operated upon.

At the time of the operation it was found that he was suffering from a slowly perforating carcinomatous ulcer of the pylorus. That slowly perforating ulcer was fairly well walled off and there was no leak. There were some rather firm adhesions to the liver. The mass at the pylorus was resected and a gastro-enterostomy was done.

The patient gained rapidly in weight after the operation. There were no operative nor postoperative complications and he considered his recovery complete until a few weeks ago when his symptoms of pain with nausea and vomiting reappeared. The vomitus does not seem to be of the "coffee-ground" type and apparently there has been no occult blood. Here is a carcinoma—and this is an important point—a carcinoma in a man twenty-six years of age who presents all the classical symptoms of a typical ulcer namely pain coming on two hours after eating and being relieved by the taking of food. The chemical analysis at the time of operation was the chemical analysis we are accustomed to find in ulcer—a relatively high acidity, much free acid and occult blood.

Now the fact I intend to point out this morning and the lesson I would like you to take from this case is the difficulty of distinguishing clinically between ulcer of the stomach and carcinoma of the stomach. These are the two conditions that will present themselves to you for diagnosis and treatment. In the conclusions that we hope to draw from our present analysis the great question will come up as to whether an ulcer of the stomach falls

into the category of surgical conditions or whether it belongs in the realm of internal medicine and whether it should be treated medically or should be treated surgically. You can appreciate that that is a most important question and I think the question cannot be determined without our taking into consideration the essential and underlying fact that the difficulties of diagnosis are untold and that no matter what a man's diagnostic acumen is and no matter what a man's medical or clinical experience has been he has little right to assume from any symptoms or signs that he is dealing with a gastric ulcer rather than with a gastric carcinoma or vice versa. Take this case as a case in point. Here is a man twenty six years of age with a typical history of ulcer and at operation an ulcer perforating the stomach wall was found. A carcinomatous ulcer is much less apt to perforate than an acute inflammatory ulcer. This case therefore falls into the classification of inflammatory ulcers because it did perforate. He showed a stomach analysis of gastric ulcer and yet the microscopic picture showed carcinoma and the man is back three months later with a palpable mass that is adherent to the scar.

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eating. He had the hunger pain. That is more characteristic of duodenal ulcer than any other symptom though in my judgment it is not pathognomonic. I do not attach as much weight to that symptom as is accorded it by Moynihan. This man came back with recurrence of his former symptoms plus symptoms indicative of a partial obstruction of the pylorus. This partial obstruction of the pylorus was evidenced by vomiting and partial retention of food. The fact that there was retention but that that retention was only partial was indicated by the character of the vomitus which frequently contained food that had been eaten hours before but never the entire meal—just occasional small particles. The x ray showed that some of the bismuth was gone through the pylorus and that the stomach did not empty readily. This man had no symptoms of acute bleeding. There was no blood in the stomach analysis. He had what we believed was a duodenal ulcer that had resulted in the development of a cicatrix with partial obstruction.

A gastro-enterostomy was done last September. It was a posterior gastro-enterostomy with practically no loop. The jejunum was brought up and attached to the posterior wall of the stomach. When we went in we found an ulcer not of the duodenum proper but apparently at the pylorus extending on the anterior wall a little farther into the duodenum than into the pylorus. The pylorus was not shut off and the gastro-enterostomy opening was made $1\frac{1}{2}$ inches long. Why do I go into these details? Because these are the questions that you are confronted with today in your practical work and I am attempting to answer them by the demonstration of concrete examples.

This man ultimately made a complete recovery after resutting of the abdominal wound which ruptured on the tenth day after the operation. Since the operation he has had practically no trouble though he is apt to suffer if he overeats a disturbance which he had while in the hospital.

CASE III

This patient upon whom we operated December 1, 1916 is fifty two years old. He came into the hospital with the history

that he had never been sick that he had never had any disturbance whatever until about six or seven months before he came to the hospital. During that time he had been treated in various ways with diet and with medicines by various men without relief. He gave this history. Seven months before entering the hospital he began to have paroxysms of pain after eating which were relieved by vomiting the pain and vomiting became worse, during the last two months he has vomited large quantities of fluid which at times contained occult blood. He lost 45 pounds in weight during these seven months. The x ray picture showed that there was an almost complete obstruction at the pylorus but there were no filling defects. A tentative diagnosis of carcinoma was made. Why? First because of his age and second because of the history. After the onset of his first symptoms seven months before admission to the hospital he went on rapidly to an obstruction of the pylorus. That would imply a rapidly growing affair. An ulcer usually produces obstruction by the formation of scar tissue with the resultant contracting cicatrix—and that is usually a number of years in developing. The x ray picture showed an almost complete blocking of the pylorus. This man vomited practically everything he ate or drank sometimes retaining particles of food for several days before they were expelled.

At the time of operation we found not a carcinoma but a complete blocking of the pylorus from a duodenal ulcer just outside of the pylorus a long more or less annular ulcer which had resulted in a practically complete shutting off of the pylorus. This man's condition was not good. A rather rapid gastro-enterostomy was done. He has made an ultimate recovery. He left the hospital eleven days after the operation and came to my office four five or fifteen days later. He has steadily improved. He has never vomited since the operation. He has gained nearly 20 pounds in a little over six weeks. This was not a carcinoma and therefore this man's ultimate recovery is beyond question it seems to me because it was an ideal case for a gastro-enterostomy. The question of whether we should or should not block off the pylorus did not come up here for it was already blocked.

These are not selected cases. These are all cases done in the last year and a half. They are simply routine cases. I want to call your attention to the fact that there is no vomiting and no vicious circle and that they are having no disturbance, and yet the pylorus has not been closed in any of these cases. The gastro-enterostomy has been done without a loop, posteriorly, with the course of the jejunum corresponding to the direction of the flow of the gastric contents. The posterior side of the jejunum has not been turned up toward the left wall, as is sometimes done. I am not presenting these cases as the ultimate answer to the question of whether the pylorus should or should not be closed. I will confess to you frankly and freely that I am not yet convinced as to which is the better procedure. I will say that so far as I am personally concerned in the cases in which I did not close the pylorus I have had no vicious circle, and that I have had disturbances where I closed the pylorus. Again let me say that this is not the ultimate answer. The ultimate answer gentlemen will have to make some day.

There is no tumor mass to be felt here today and this man is doing well.

CASE IV

This man came in presenting the typical picture of pernicious anemia, and the differential diagnosis had to be made between three things—between pernicious anemia and carcinoma of the stomach, and between pernicious anemia and ulcer of the stomach, or, if you like, between malignant or benign ulcer and pernicious anemia. He came in principally because of a hemorrhage that came from the stomach—a hemorrhage of bright red blood. That brings up the question, May a sudden hemorrhage—an emesis of bright red blood—occur in carcinoma of the stomach? The answer to that question is, positively, "Yes, it may." Rarely does such a hemorrhage occur from a malignant ulcer, but it may. I think I cited to you just a short time ago a case that came under my observation, a friend whom I had known all my life. I was called to see him and found him markedly anemic with a hemoglobin between 30 and 40 per cent. and a red blood count of 2,000,000. He had had three large

emesis of bright red blood. We went over his history carefully. He was perfectly well until he was taken suddenly sick with vomiting of that much blood, nearly a quart, enough to reduce his hemoglobin to 30 per cent and the reds to 2,000,000. We went over the history carefully to see if we could detect any evidence of gastric ulcer or gastric carcinoma, and nothing could be elicited. There was no tumor mass to be felt, he had not lost in weight. That man succumbed in three weeks from the time of his first hemorrhage. He had no more hemorrhages after the first three. He did not succumb to the bleeding, of that we were convinced. An autopsy was granted and we found one of the largest carcinomas of the stomach that I have ever seen. It involved the whole greater curvature of the stomach, with some metastases in the lungs and a number of metastases in the glands and yet he had not had the slightest evidence of being sick until three weeks before he died. I cite that again as evidence to show that no one can say at times whether an ulceration in the stomach is benign or malignant on the basis of the available data.

This man has been gone over very carefully, and a transfusion was considered but it was found that the blood of the donor, his son, could not be used. However, he began to improve and improved rapidly. In our first blood count we found 874,000 erythrocytes to the cubic millimeter, today we find 4,448,000. The hemoglobin was as low as 20 per cent. Now it is 70 per cent. The x ray picture showed that a six hour residue was present. The duodenal bulb was not seen, but no constant defect was noted. The findings indicate an obstructive lesion at the pylorus.

The next question is, Can we eliminate pernicious anemia? Is this just one of the remissions that come in pernicious anemia? It seems to me that our x ray picture helps us to decide that. It seems to me that an x ray picture in which the anatomic bulb fails to appear and the presence of a definite six hour residue helps to convince us that there is some obstruction to the duodenum, or the pylorus if you like. The vomiting of that much blood and the presence of a large amount of blood in the stools makes it appear that the anemia is a secondary anemia secondary to

severe gastric hemorrhages. Moreover that severe gastric hemorrhage probably came from a benign and not a malignant ulcer. Why do I assume that? I assume that a malignant ulcer in this man would not have permitted the blood-picture to change so rapidly and so favorably as this man's blood-picture has. This man represents what? He represents the type of patient in whom we have to deal with a duodenal ulcer presumably duodenal because of the x-ray picture but anyway an ulcer close to the pylorus which is a gastric ulcer if you like which is improving and is improving rapidly on medicinal treatment. Are we going to contend this morning that medicinal treatment does not cure a large number of so-called ulcerations in the stomach and duodenum? 'No' absolutely no! It is my conviction that medicinal treatment cures a very large percentage of duodenal and gastric ulcers. This is one of them. This is one of the cases in which it is extremely difficult to differentiate between pernicious anemia, malignant ulcer and inflammatory ulcer. This however on the basis of the facts already mentioned we believe is an inflammatory ulcer and it is improving rapidly under medicinal treatment. Why do we presume that this patient has an ulcer? First to go back to the history. The history is that the patient had trouble over a long period of time culminating in a sudden severe hemorrhage, suggesting an inflammatory rather than a malignant ulcer. Second the physical findings. The physical findings are those that one gets with a healing or healed non-malignant ulcer. These are not the physical findings that you get with a malignant ulcer. Such rapid improvement as this does not come with a carcinoma. Third the x-ray pictures. The x-rays show no filling defect. Filling defects occur in carcinoma. Fourth, the stomach contents are those of an ulcer rather than a carcinoma.

CASE V

This man is fifty-nine years old and came in January 11, 191 because of constipation and abdominal pain. He has been constipated for several years and has taken various cathartics to obtain a regular bowel movement. The pain in the abdomen has

been periodic for the last ten years. The attacks last about three weeks. The pain is mostly in the epigastrium and spreads below the umbilicus. He has noticed no relation between the pain and eating, though he says a drink of cold water will relieve the pain. He belches much gas and feels uncomfortable after that. He says that eight years ago he took Dr. Sippy's treatment for gastric ulcer. He had typhoid fever at twenty. He had gonorrhœa twenty years ago and a chancre at the same time. There has been no loss in weight. He drinks heavily. One sister died of cancer of the breast.

Examination shows a well developed and well nourished man. Temperature on admission was 98° F. Scalp, head, nose, and eyes are negative. Teeth are carious and pyorrhea is marked. Lungs and heart are negative. Pulse in the radial artery is good. Blood pressure is 185 systolic and 105 diastolic. Urine and blood count are negative. Ewald test meal showed a total acidity of 76 free 37, blood present.

Now what points of differentiation come out in this clinical picture? Here again we must attempt to differentiate between a simple ulcer and a malignant ulcer, and possibly one other factor the question of a chronic alcoholic gastritis with no ulceration of the mucosa. Pernicious anemia can be excluded immediately. The important points in the history are Recurrent attacks of epigastric pain with vomiting over a period of ten years, previous treatments for gastric ulcer, occasional hematemesis. That is a history that points to a non malignant rather than a malignant ulceration. Next consider the physical findings. There is no tumor mass palpable. The appearance of the man is not that of a man suffering with a carcinoma. With carcinoma a man shows evidences of cachexia. Cachexia means what? It means loss of weight with a subicteric color and a wrinkling of the skin. It occurs in carcinoma and occurs quite independently of the degree of malnutrition the patients present as a result of the obstruction to the outflow of food from the stomach. We find this cachexia marked in patients who suffer no marked malnutrition from loss of food. Then what does cachexia mean? It must mean that these patients are suffering from a toxæmia.

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associated with carcinoma and that this is responsible for the loss of weight and the loss of muscle tone. This man, then, so far shows no evidences of carcinoma.

We next examine the x-ray picture—it is negative. In further confirmation of our diagnosis analysis of the gastric contents shows them to be most compatible with ulcer than we find evidences of hyperacidity and a little blood.

What is the pathology of gastric ulcer? The cause of gastric ulcer as we believe is probably a disturbance in the circulation of the part ulcerated. That may be due to embolism, to thrombosis or to blocking of the lymphatic circulation from some cause. Hyperacidity I think is a result rather than a cause of gastric ulcer. This man's history as I have already pointed out considered in the light of the physical findings and the results of gastric analysis points to a gastric ulcer rather than to a carcinoma.

CASE VI

This patient I want to show you mostly for the purpose of emphasizing the difficulties of diagnosis. This patient came to us two years ago in May with a history of having had disturbance over a period of about three years coming on gradually. The history was typical—pain after eating, regurgitation of gas, the pain relieved at first by the taking of soda or of food. Later the pain became almost constant and there was a great deal of nausea and vomiting so that when she came to the hospital she was vomiting practically everything which was taken into the stomach. This patient at that time presented a picture of cachexia. The stomach findings as I remember showed a total acidity of 17 and no free hydrochloric acid. The x-ray picture showed a pyloric obstruction and the whole picture was classic of carcinoma. She had a palpable tumor which moved rather freely with respiration and which felt firm and nodular like a carcinoma. She was advised to have an operation.

When we opened the abdomen we found a large tumor at the pylorus with no material involvement of the peritoneum. I think one of the ways that you can differentiate pathologically between a malignant and non-malignant ulceration of the stomach

ach is to note the peritoneum If the peritoneum is not involved and can be moved on the underlying tumor mass, it is more apt to be a carcinoma than an inflammatory process An inflammatory process is more apt to involve and go through the peritoneum I thought it was a carcinoma and our medical man thought it was a carcinoma She was running a pulse of 140 to 150 The medical man stood at one side and insisted that we do a resection If you do surgery and have a medical man standing at your elbow assuming no responsibility, it is all right to be guided by his advice but you must remember that what you do is your own act for which you are responsible, therefore, do not be too strongly influenced by the medical man He says take out a liver or a spleen or 16 feet of the small intestine It is mighty easy for him to stand about and say, Do a resection of the stomach " but if he had that patient's life in his hands and from his experience knew that that patient would succumb from that resection, he would talk differently This case points out very clearly the fallibility of our human judgment I thought the lesion was carcinoma, everything seemed to point to a carcinoma A gastro-enterostomy was done with the expectation of getting the patient built up and then doing a resection This tumor was adherent to the liver It is now two years since the operation, and this patient today is perfectly well She has no disturbance at all and the tumor has entirely disappeared without our ever getting to do our projected resection of the stomach

What does this mean? It means that this was not a malignant tumor It must have been an inflammatory mass so closely simulating carcinoma as to deceive some of the best medical men in Chicago This patient came back to us week after week refusing the second operation Today she is well—impressing us with the difficulty of distinguishing between malignant and non malignant disease of the stomach What else does this teach? That we must be just as careful just as slow and just as reserved in making a diagnosis of gastric ulcer and ruling out carcinoma The converse of this case is always imminent and we are very apt to err either way I am not going this morning to enter into the controversy as to what part in the etiology of carcinoma simple

inflammatory ulcer plays though I am somewhat familiar with it, but I feel that I must repeat one statement which I made in discussing carcinoma of the breast. There is no such thing as a precancerous state, a lesion either is carcinoma or it is not. I think that you will agree with me when I say that the difficulty at times in differentiating between a beginning carcinoma and a beginning ulcer is almost insurmountable. I believe and I say this with all kindness toward the men who are doing this work that it is impossible at times for a pathologist to take a beginning carcinoma and say whether the ulceration he finds is the result of a primary or inflammatory ulcer or whether it is the result of displacement of the epithelial cells with secondary degeneration. I do not see how he can. Then what must be our viewpoint? What must be the stand that we shall take? Just this. Recalling the period before the discovery of the cause of tuberculosis by Koch, many cases of tuberculosis were called something else and many cases of something else were called tuberculosis. It is the same with carcinoma. Today although carcinoma seldom is pathologically mistaken for something else many other conditions are often called carcinoma. We are frequently not at all clear in our diagnosis. I think that advancement will be made much more rapidly if we assume that we do not know whether a gastric ulcer is one of the most common causes of gastric carcinoma or not.

CASE VII

This man has been complaining of gastric distress altogether about six years. This again brings up the question which we have discussed in a fragmentary way in connection with the preceding cases, that is the relation between simple and malignant ulcer. Pathologists maintain as do most clinicians that

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to answer that in this way we see carcinoma of seven eight nine and ten years' duration, and in certain parts of the body of a period even in excess of ten years a long clinical history therefore, is hardly a safe reason for the exclusion of malignancy.

This man has been sick for a period of six years. He has had hemorrhages from the stomach he has had pain when he took food. He was operated on a year ago last May after having had symptoms for five years. A growth was removed from the outlet of the stomach. He gained 40 pounds in weight after the operation. Then what happened? About a year afterward he became sick again and has been sick ever since. At the present time he vomits practically all he eats. This man comes in with recurrent symptoms. There is a little hernia at the upper end of the scar which did not come until he was taken sick the last time. This is a history that looks decidedly like a carcinoma history, decidedly like a recurrence of what he had before. Can an obstruction recur? Can he get another ulcer? Yes he can get another ulcer that might simulate very closely a carcinoma. He is cachectic he has a mass in his abdomen that distinctly moves with respiration a mass that comes down to the umbilicus a mass that is more or less fixed a mass that is more or less irregular in outline and somewhat fixed to the anterior abdominal wall. It feels distinctly like a carcinoma. You cannot feel the edge of the liver. I am sure this is not the liver that comes down. We must admit in all fairness that this case certainly resembles in its history an inflammatory ulcer which has become a malignant ulcer. The x ray picture shows that a six hour residue is present. It shows a distinct filling defect which is evidently due to a carcinoma. The cardiac opening and the lesser curvature are involved. There is undoubtedly an obstruction involving the lower portion of the esophagus. We must admit that this may be one of those cases in which a carcinoma becomes superimposed on a gastric ulcer but as I have pointed out we cannot assume that this interpretation is correct beyond peradventure—the lesion may have been carcinoma from the beginning.

CASE VIII

This man had a gastro-enterostomy done a year ago last June for gastric ulcer that was producing some obstruction to the pylorus. He is having no trouble at all now. He eats everything. He has gained 37 pounds. We did a posterior gastro-

enterostomy without closing the pylorus I have not seen him for a year until today

CASE IX

This patient came to us last June with a history running over a period of ten years. She had the typical and classic symptoms of a gastric ulcer plus an obstruction. She vomited everything she ate or drank. The stomach contents showed some free hydrochloric acid. They were not the stomach contents of a carcinoma. She had a large movable mass in the abdomen occupying the center line. We felt that it was probably a malignant growth. She was operated on and we found a large undifferentiated mass occupying about two-thirds of the lesser curvature of the stomach and extending down to the greater curvature, completely obstructing the passage of food. At the time of operation examination led me to state that the lesion was malignant. It seemed rather absurd to take out as large a tumor as that with which we had to deal nevertheless we took it out by resection. At least two-thirds of the stomach was resected just leaving a little stump at the pylorus. An end to-end anastomosis was done.

This patient never vomited after the operation. She has never had pain. She eats everything that she wants to and has gained 54 pounds. She has no disturbance of any kind. This is not shown as the result of a brilliant operation. There are lots of things that seem more simple that are much more difficult to do than a resection of the stomach. It is shown for the purpose of illustrating what a patient is like six months after having had such a resection.

CASE X

This man came in with a long history running over fourteen years. He had a slowly perforating gastric ulcer. He was operated on December 12th and at that time a posterior gastro-enterostomy was done by Dr. Oliver. He has gained 20 pounds. This question may arise. Will a patient with carcinoma improve and retain the ground gained for a long period when a posterior gastro-enterostomy is done? In my experience they improve sometimes very rapidly but only for a few months. I have

never seen a case of carcinoma in which a posterior gastro enterostomy was done that showed a prolonged—that is, a lasting—improvement I think those cases which are reported as being improved over a long period of time are not carcinomatous

CASE XI

This is a girl who gives a history of having been sick for ten years She came in with the typical findings of gastric ulcer, namely, the history of prolonged indigestion relieved by eating and relieved by soda, hyperacidity, vomiting, and occult blood The trouble had grown worse in the last few months before we saw her, and she vomited practically everything she ate x Ray pictures, motor meal, and stomach analysis all showed a distinct obstruction at the pylorus

At operation it was found that she had a small, more or less annular ulcer just inside the pylorus on the lesser curvature, practically completely blocking the pylorus The stomach was enlarged A gastro-enterostomy was done and the patient has made a fairly good recovery not so brilliant as some of the others She has had a little disturbance since the operation She tells me that she vomited about two weeks ago She has gained 10 $\frac{1}{2}$ pounds since the operation on September 11, 1916

Now the question comes up What deductions are we to make from the cases we have seen this morning? I say this in all fairness I hope to my medical colleagues Our medical statistics show that about 85 to 90 per cent of gastric and duodenal ulcers will get well with good feeding and proper care I wish to take issue with that statement I believe that a large percentage of gastric and duodenal ulcers will get well under medical treatment but I do not believe that 90 per cent get well One thing which renders these statistics fallacious is the fact that the medical man cannot get all the evidence When a case recurs and recurs it goes to the other man and therefore the first doctor's statistics are incomplete He also draws another conclusion which I believe is fallacious and I think you will agree with me if you watch your medical clinics The internist gets a case in which a gastro-enterostomy has been done,

and he finds that the patient has not been cured. He shows the case to you and to the medical profession as a case that surgery did not cure. The argument is fallacious again because they only see the cases that do not get well. The ones that get well by surgery do not go to the medical man. It is only the cases in which the result is not good that go back to the medical man. We have showed you this morning many cases that got well by medical treatment, and there are a lot of them, but the percentage is not 90.

Bringing up the question of what you should do in the individual case. First make as accurate a diagnosis as possible; second, institute a strict medical regime, the basis of which is rest, diet, alkalies, and, in selected cases, gastric lavage, and then, if the trouble recurs and recurs, that case becomes a surgical case. If bleeding persists or if there is pyloric obstruction again the condition becomes surgical. If it is not reasonably possible to make a diagnosis of simple ulcer in contradistinction to malignant ulcer, the patient should have the advantage of an early operation.

Just a word with regard to closure of the pylorus. I am not closing the pylorus except in rare cases. I have not had occasion to observe that procedure over a long period of time. I think I have had less disturbance with vomiting and the recurrence of symptoms in the cases in which I have not closed the pylorus than in the cases in which I have. However I am still open to conviction.

CLINIC OF DR. FREDERICK G. DYAS

Cook County Hospital

REMOVAL OF ABDOMINAL TUMORS UNDER LOCAL ANESTHESIA

Summary Two cases illustrating the great value of local anesthesia for abdominal work in the presence of conditions in which ether anesthesia is contraindicated. The Farr infiltration apparatus and table for visual exploration of the abdomen without the employment of traction on the viscera.

LOCAL anesthesia is now recognized as a life-saving measure in those cases in which it is impossible to administer a general anesthetic. Every large hospital furnishes almost daily cases in which were it not for local anesthesia the patient would stand absolutely no chance of recovery. The purpose of this article is to point out the extreme cases which may be successfully operated under local anesthesia and to illustrate by two recently operated cases the technic of administering local anesthesia.

Cases of large abdominal tumors frequently require operation as an emergency measure, and either through conditions brought about by the tumor itself or by conditions outside of the abdominal cavity will suddenly become grave. The patients are so handicapped by the presence of a large abdominal tumor that the only hope lies in relief of the mechanical conditions brought about by the presence of the neoplasm. This last class of cases is illustrated by Case I.

CASE I —A telephone operator, twenty nine years of age, was admitted to Cook County Hospital January 5, 1918, complaining of pain in the right side slight fever and general weakness. She had left the hospital four days previously believed to be fully convalescent from a pneumonia which had had no definite localized signs. She also had an ovarian cyst of five

months' standing which was about the size of a full-term pregnancy. Before leaving the hospital she had been advised to remain and have this cyst removed.

After leaving the hospital she felt well for three days, when she began to have sharp pain in the right side of the abdomen on attempting to rise from her chair. This was not accompanied by nausea or vomiting. The pain was relieved by lying down but was accentuated by moving to either side, coughing or upon straining movements such as movement of the bowels or micturition. She had no chills or vomiting.

Five years previous the patient had had an appendectomy, a right sided oophorectomy, and salpingectomy.

Upon examination her pulse was 118 respirations 22, and temperature 102° F. Leukocyte count was 12,000.

Physical examination revealed scattered rales over the left lower lung posteriorly. The heart was negative. She had a severe hacking cough and brought up large quantities of sputum. The face was flushed and the tongue heavily coated. The abdomen was markedly distended with fluid. Percussion note was flat about the umbilicus and it was possible to detect waves of fluid within the abdomen. There was tenderness and muscular rigidity over the lower right quadrant of the abdomen.

Upon vaginal examination an indefinite fluctuating mass was to be felt in the posterior culdesac.

A diagnosis of ovarian cyst with twisted pedicle and acute diffuse bronchitis was made.

Examination of the sputum showed no tubercle bacilli. The patient ran a temperature varying from 100° to 103.6° F., but on January 11th, six days after admission, the temperature dropped to normal. On the 12th she was transferred to the surgical service for operation, as the quantity of fluid within the abdominal cavity was rapidly increasing in amount and her respiration was greatly embarrassed.

Operation (January 12 1918) -- The usual abdominal preparation was made and a local infiltration of the skin and subcutaneous tissues was made reaching from about 2 inches above the umbilicus well down toward the symphysis pubis (Fig. 17).

An incision was made through the welt produced by the infiltration down to the fascia. A second line of infiltration was then made extending down through the peritoneum. The peritoneum was opened and the cyst exposed. A large trocar was introduced into the cyst and immediately a thick dark brownish fluid escaped. In all 10 quarts were removed. After remov

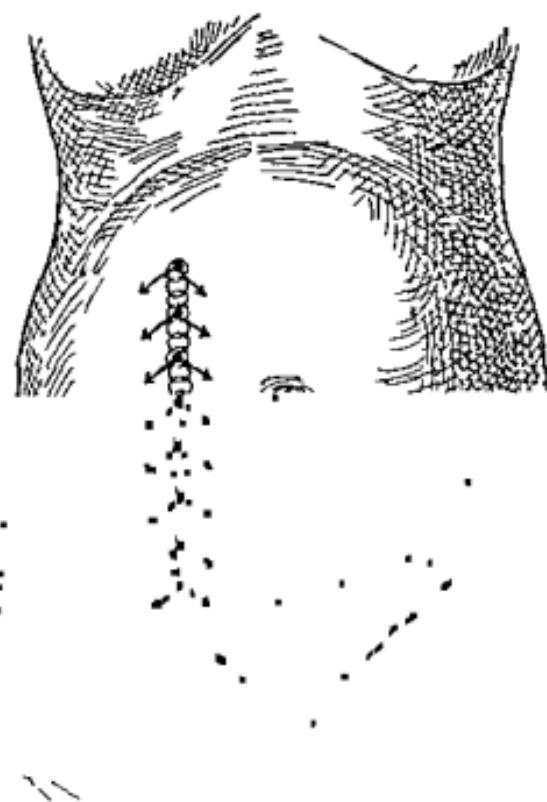


Fig. 1-2 Removal of large abdominal tumor under local anesthesia—Line of infiltration

ing as much of the fluid as possible with the trocar the cyst wall was incised and it was found to contain numbers of daughter cysts (Fig. 173). It was possible after the evacuation of the fluid to bring out the entire cyst through the abdominal wall exposing its attachment down to the left broad ligament. At this step of the operation it was necessary to administer a small amount of nitrous oxide and oxygen while the clamps were

applied to the pedicle and the cyst attachment severed. The pedicle was sutured over in the usual way by heavy catgut running suture and the abdomen closed without drainage.

The patient made an uneventful recovery from the operation and the skin clips and deep silkworm stitches were removed one week later. There was a slight infection of the skin wound.



which rapidly healed up. The bronchitis improved markedly and the patient left the hospital at the end of one month apparently well.

This illustrates a case of acute extra abdominal lesion complicated by a large abdominal tumor. Because of the respiratory embarrassment and the acute diffuse bronchitis ether anesthesia was not to be thought of. The patient complained

of no pain under the local anesthesia. The use of the nitrous oxide and oxygen was not at the request of the patient, but was resorted to in order to save time at the close of the operation in a situation where local anesthesia is difficult to obtain.

CASE II.—The second case concerns a woman of twenty seven years, who came into the hospital on October 14, 1917, complaining of swelling of the abdomen, abdominal pain, loss of weight, and cough.

She had felt quite well up until three months before admission. Since that time the abdomen had been getting progressively larger and at first she thought she was pregnant. She noticed, however, that she was losing weight rapidly, but was unable to state how many pounds. The cough has been present for the past two weeks.

On examination the entire left lung was found to be flat, with greatly diminished breath sounds. Dulness was present over the entire abdomen, which was greatly distended with fluid. There was very little evidence of collateral venous circulation in the abdominal wall. However, upon palpation masses of various sizes could be felt through the abdominal wall, and these seemed to be part of a large tumor. There was some edema of the legs, possibly due to the pressure of the tumor.

Examination of the urine, sputum, gastric contents, and stools was negative. The right chest was tapped many times and large amounts of a serofibrinous fluid were removed, with a specific gravity of 1020. The abdomen was tapped on several occasions and large amounts of hemorrhagic colloidal fluid removed. The Wassermann test was negative.

A diagnosis of tuberculous pleurisy with effusion and tuberculous peritonitis with ascites was made. Later when colloidal material was obtained on tapping the abdominal tumor, a diagnosis of malignancy of the ovary was made.

The patient left the hospital on December 23d and returned later because of the increasing severity of the symptoms. She was then transferred to the surgical service.

Operation.—The operation was performed under local anesthesia, the infiltration of the abdominal wall extending from

about 2 inches above the umbilicus to close to the symphysis over the right rectus muscle. The abdomen was opened without pain to the patient and disclosed a large, irregular, lobulated mass. Upon introducing a trocar into this mass only a small amount of fluid was obtained. An incision was then made into the mass, and it was found that the outer cyst wall contained many smaller tumors, which were fused together. Fortunately the cyst wall was not attached to the peritoneum or to any of the intraperitoneal viscera. It was possible then to luxate this enormous tumor through the abdominal incision. At this point recourse was had to nitrous oxide and oxygen, the pedicle of the tumor clamped and severed, and the stump sutured with running catgut. The abdomen was closed without drainage.

The patient did nicely until the fifth day, when she died of exhaustion. Unquestionably this patient should have been operated at an earlier period before her cachexia became so marked.

Upon examination of the tumor no evidence of malignancy was found the clinical diagnosis being cyst of the ovary

The lesson taught by this case is that abdominal tumors in which an absolute diagnosis cannot be made will have a possible chance of recovery by an early laparotomy under local anesthesia. Local anesthesia *per se* is without danger and in practically every case affords opportunity for intra abdominal inspection and exploration without pain or danger to the patient. Robert Emmett Farr, of Minneapolis has introduced a very useful method for infiltration of the tissues. In effect his ap-

turn, connected with a needle. Positive pressure is produced within the glass buret by means of a rubber bulb which pumps air into the tube.

This helpful apparatus also obviates the necessity of syringes which are constantly getting out of order

Another useful suggestion of Dr. Farr's is the employment of a suitable table which changes the posture of the patient for visual exploration of the abdomen. By moving the patient from side to side and into the Trendelenburg position or reversed Trendelenburg position it is possible by utilizing the force of gravity to bring much of the intraperitoneal contents in review before the eye without the use of traction upon the viscera. One's ability to explore the abdomen under local anesthesia increases with practice and the postural method adds greatly to the comfort of the patient and minimizes the amount of traction required to expose the viscera.

The solution used in both of these cases was $\frac{1}{2}$ of 1 per cent apothesin.

USE OF THE HOGLUND BONE TRANSPLANT FOR UNUNITED FRACTURES OF THE TIBIA

Summary A patient presenting a spiral fracture of both bones of the leg in which satisfactory reduction could not be maintained by external fixation—the Hoglund intramedullary bone-splint—technic of its use—results

THE patient, a dressmaker, thirty five years of age, slipped on a wet floor and fell with her left leg beneath her. She felt the bone give way and heard it crack. She was immediately brought to the hospital and the classical signs of fracture found, namely, evidence of local trauma, loss of function, crepitus, deformity, and false point of motion. The fracture had not compounded, but there was a great tendency for the lower fragment of the tibia to pierce the overlying skin.

A skiagram revealed a spiral fracture of the lower third of the tibia and a fracture of the fibula at its upper third. Attempts at reduction under anesthesia were without success, the skiagrams showing that there was about an inch of overriding of the fragments of the tibia. It was decided that an open operation with mechanical immobilization of the fragments would be the only means of securing adequate reduction and fixation.

Operation—Under ether anesthesia an incision was made from a point about 3 inches above the articular surface of the tibia and along its flat surface to a point slightly above the external malleolus. The soft tissues and the periosteum were retracted to either side and the bony fragments brought up out of the wound and freshened by means of a sharp curet and a rongeur forceps.

It was decided to use the method of transplantation advocated by Dr. Emil Hoglund. By means of a motor-driven saw two parallel cuts were made in the upper long fragment of the tibia extending from a point about 1 inch above the fractured surface for 5 inches along the shaft of the bone. These longitudinal parallel cuts were united at either end by a transverse

cut with the chisel (Fig. 174, 1) The fragments were then held in alignment and an attempt made to push the transplant

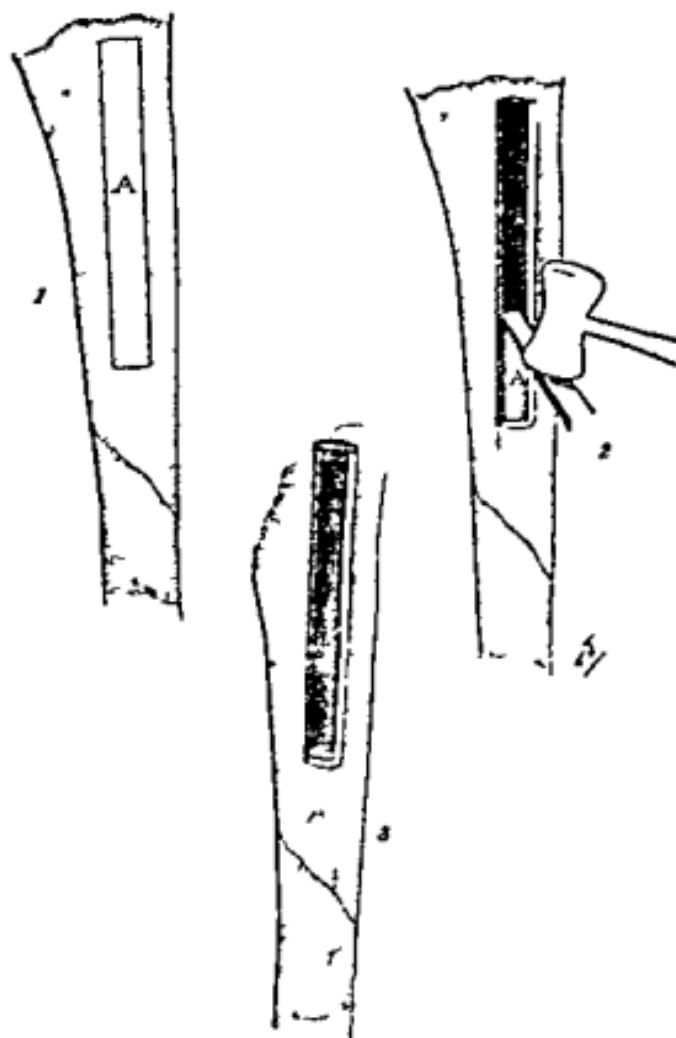


Fig. 174—1. *A* Outline of transplant made by parallel longitudinal cuts with twin saws driven by electric motor. Loosened at ends by transverse cuts with narrow chisel. 2 The transplant depressed into medullary cavity and carried downward by means of a few hammer blows against the flat surface of a chisel pressed against upper end of transplant. 3 Showing transplant in place and space left by its removal.

into the medullary cavity with the idea of driving it down through the medullary cavity until it bridged over the two fragments of the bone. Unfortunately this was not possible, for

the reason that the longitudinal saw cuts had been made with a single circular saw rather than with the twin saws, and as a result of this the direction of the saw cuts was such that a trough like cavity resulted, so that in effect the transplant was a wedge being broader upon its cortical surface than upon its medullary surface. Upon discovering this error the transplant was removed and introduced from below into the lower end of the upper fragment. The two bony fragments were then brought into alignment and the transplant, which now could be seen through the trough like opening in the upper fragment, was easily carried downward through the medullary cavity until it bridged over the fracture and reached to the lowest portion of the medullary cavity of the lower fragment (Fig. 174 2, 3).

The principle of this method must appeal to every one, because where the twin saws are used it is unnecessary even to lift the transplant out of its bony bed. It is merely depressed into the medullary cavity and driven on downward until it bridges over the line of fracture. The simplicity of the method must recommend it to all those who do much bone surgery. It has the further advantage of not incapacitating the other leg as it was formerly the custom to remove the transplant from one limb and introduce it into the bone of the opposite side.

In the case above described the patient showed signs of a slight infection about the tenth day. This was treated with bismuth paste and rapidly healed up. No interference with bony union took place and the patient has a strong line of union with perfect anatomic restoration now two months after the operation.

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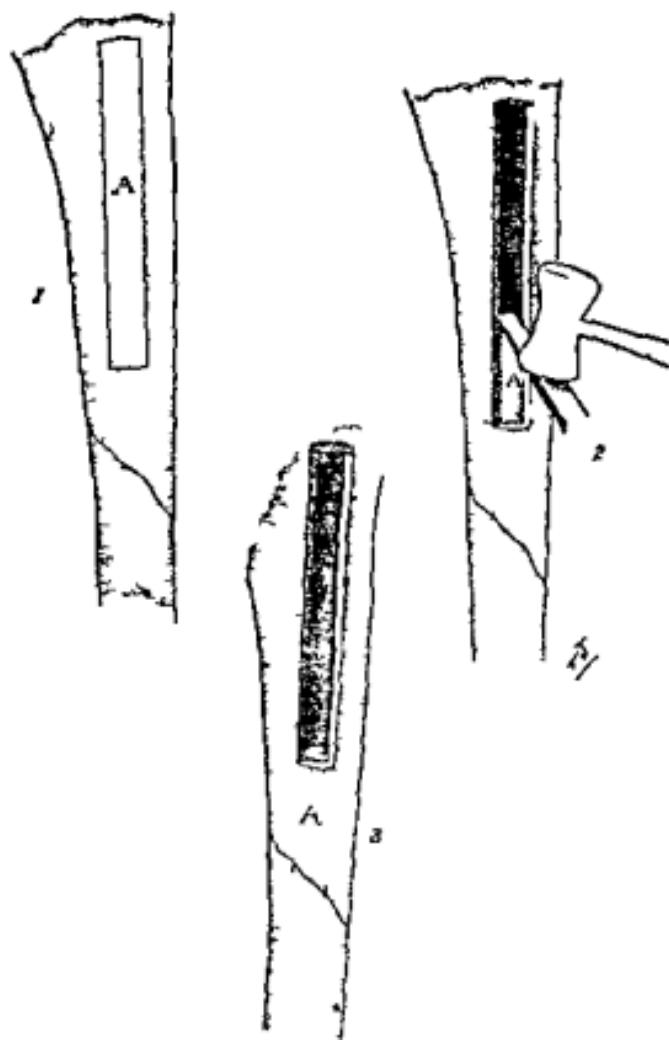


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CLINIC OF DR NELSON M PERCY

AUGUSTANA HOSPITAL

TUMOR OF THE GASSERIAN GANGLION

Summary History and physical examination of patient—the diagnosis—differentiation of tic douloureux, infection of spheno-dal sinus and tumor operation histology of tumors of the gasserian ganglion postoperative history of the present case

THE patient is a male thirty-one years of age, a farmer by occupation. His family history is negative, as are also his marital and past medical histories. Habits are negative, and he denies any venereal history.

He comes to the hospital complaining of pain in the right forehead right ear, and right side of face. The trouble started in January, 1916 when the patient noticed pain above the right eye. The pain was dull in character and severe, with intermittent increase in severity. The exacerbations had no recognized provoking cause. About one year later the patient began to have similar pain along the right lower jaw. At this time the pain was continuous with periods of severe exacerbations. About April of this year pain of a similar character appeared under the right eye and over the right cheek. At times there are sharp shooting pains in the right ear. For the past six months there has been a sense of "numbness" in the right cheek and jaw, and also during this time there has been noticed a gradually developing atrophy of the muscles of the right side of the face and jaw. For some time past he has been unable to open the jaw to the former normal extent.

A few months ago the patient went to one of our prominent clinics, and an infected right antrum was found and drained. Practically no relief was obtained from this. A few weeks ago, at another clinic the inferior dental nerve was resected and the infra-orbital nerve injected with alcohol. Very little relief

resulted from this, and one week later the inferior dental nerve was injected with alcohol. Some relief from this was obtained for a short time, but soon became worse again, and for the past month the patient has suffered continuously night and day. During the past week he has used opiates freely, from which he has not been able to obtain much rest. He has lost 50 pounds in weight during the past few months. There has been no nausea or vomiting, nor any failing of vision. No tinnitus nor vertigo. There has been questionable diplopia.

Physical Examination.—The patient is a well-developed and only fairly well nourished male. The mental state is dull and the patient is childish. Color of skin and mucous membranes is good. Examination of the chest, lungs, heart, blood vessels, abdomen, genitalia, and extremities shows entirely negative findings. Reflexes not remarkable. Peripheral lymph nodes nowhere enlarged, save for slight enlargement of the inguinal nodes on both sides. The interesting findings are confined to the head. The skull is symmetric and shows no exostoses, depressions, or tender areas. Scalp clean and without scars. The facial expression is dull. The skin of right side of face is more red and is warmer than that of the left. There is a slight sagging of the right cheek, but no definite atrophy is found. Sensation to touch is diminished to absent over the right forehead, cheek, and jaw.

Eyes—There is a marked conjunctival injection in the right eye, and considerable swelling in and about the two right eyelids. There are blephorospasm and photophobia on the right while the left shows no such findings. The pupils are equal, regular and round, and react well to light and accommodation. No ptosis nor nystagmus. There is present an external strabismus on the right, which varies in degree, increasing with the performance of the remaining extra-ocular movements, which are otherwise well performed. No gross disturbance of vision made out.

Ears—Negative, except for slight impairment of hearing on the right.

Nose, negative. Teeth in good condition. Tongue clear, protruding in midline.

There is marked limitation of movement of lower jaw, patient being unable to separate the teeth more than 13 cm Motion of jaw not painful Inspection of throat difficult on account of inability to open mouth

The urine is negative One Wassermann test on blood serum was negative another was slightly positive Ten days ago an attempt was made to inject the inferior and middle branches of the fifth nerve with alcohol but very little relief followed While the patient is never free from pain the suffering is worse at night than during the daytime During the past few days the patient has taken from 2 to 3½ grains of morphine each night and then was not entirely relieved

COMMENTS BY DR PERCY

Diagnosis—It seems likely that we are dealing with a tumor of the gasserian ganglion It is evident that it cannot be simple tic douloureux because of the paralysis of the sixth nerve The pain in this case became continuous soon after the beginning of the trouble and has persisted since while in tic douloureux the pain is never so persistent but is intermittent in character and comes in spasms There really has been no interval of relief from pain in this patient from the beginning of his trouble Infection of the sphenoidal sinus might cause a severe persistent pain in the region of the distribution of the fifth nerve but would not be likely to cause paralysis of the sixth nerve Tumor of the gasserian ganglion is extremely rare but still with the history of the severe persistent continuous pain with involvement of the sixth nerve and the absence of other symptoms pointing to a brain tumor or to an infection of the sphenoidal sinus it seems that on these symptoms alone one is justified in making a probable diagnosis of tumor of the ganglion

Operation—The patient has been anesthetized with ether and placed in the reverse Trendelenburg position at an angle of 45 degrees A needle threaded with catgut is passed around the temporal artery and tied This controls most of the hemorrhage from the scalp flap which is to be made A running catgut suture is now placed in the scalp taking in an area of the scalp

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a little larger than the proposed scalp-flap. This suture begins at the base of the flap in front and extends round to the base posteriorly and back again to the starting point. When pulled tight and tied it prevents bleeding from the scalp distally (Fig 175 1). The inverted U shaped scalp-flap is made and two holes trephined in the skull and the bone flap sawed by means of a rotary electrically driven chain saw (Fig 175 2). The dura is now carefully separated from the skull and the temporosphenoidal lobe of the brain is lifted from the middle fossa of the skull first with the fingers and then by retractors (Fig 176 3 4). As the brain is lifted upward you can see a tumor lying in the middle fossa of the skull entirely extradural. It is not attached to the skull nor the dura but looks as though it were attached to the gasserian ganglion only. Our next step will be to ligate the middle meningeal artery just distal to where it comes out of the foramen spinosum. This procedure will be more difficult than usual because the tumor is in our way. By retracting the tumor forward the foramen spinosum is exposed and I will carry a fine silk ligature around the middle meningeal artery and ligate at two points and cut between (Fig 176 4). Now as the brain and dura are retracted further upward you can see that the base of this tumor comes from the gasserian ganglion (Fig 177 5). Fortunately so far there has been very little bleeding in fact much less than during the usual ganglion operation. On account of the size of the tumor which is about 3.5 by 2.5 cm it is impossible to expose the individual branches of the ganglion so I will first remove the tumor as close to the ganglion proper as is possible and afterward remove the ganglion.

A pair of curved forceps is placed as near the base of the tumor as possible and the growth crushed off in this manner. This gives us a good view of the ganglion. The inferior branch of the ganglion is now exposed as it enters the foramen ovale and is severed at this point. By working a little forward the middle branch is exposed as it enters the foramen rotundum and is cut. You will note that the ganglion is abnormal in consistency. It is very friable and crushes to pieces easily from the grasp of the forceps. I will not try to demonstrate the first branch of the

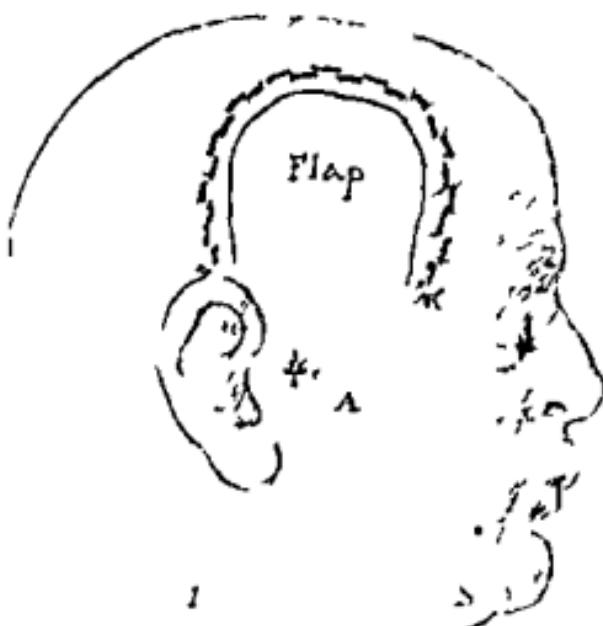
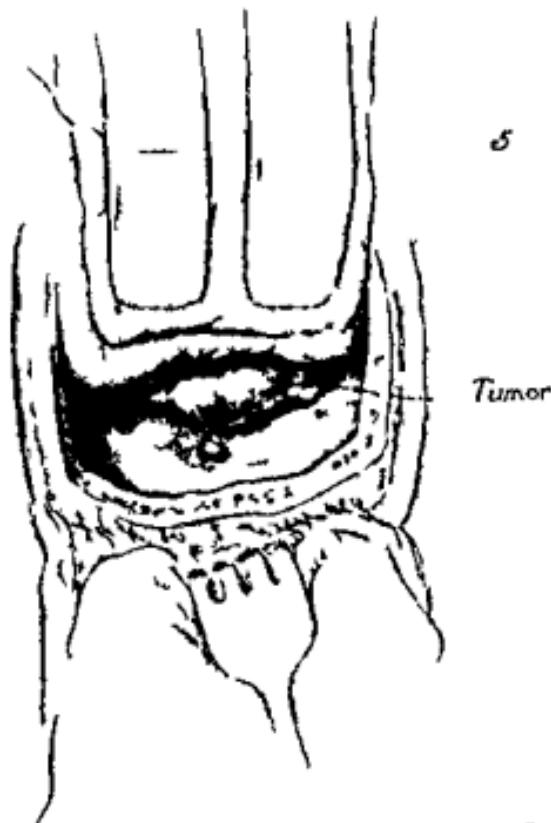


Fig. 175—1. Outline of osteoplastic flap to be turned down. Note continuous hemostatic suture. A, ligature on temporal artery. 2. Second step in formation of osteoplastic flap. Trephine openings and line for incision through the bone.



To Jones -

Fig. 177—5 Middle meningeal cut before ligation and dura further retracted bringing the tumor into view. 6 Gross appearance of tumor

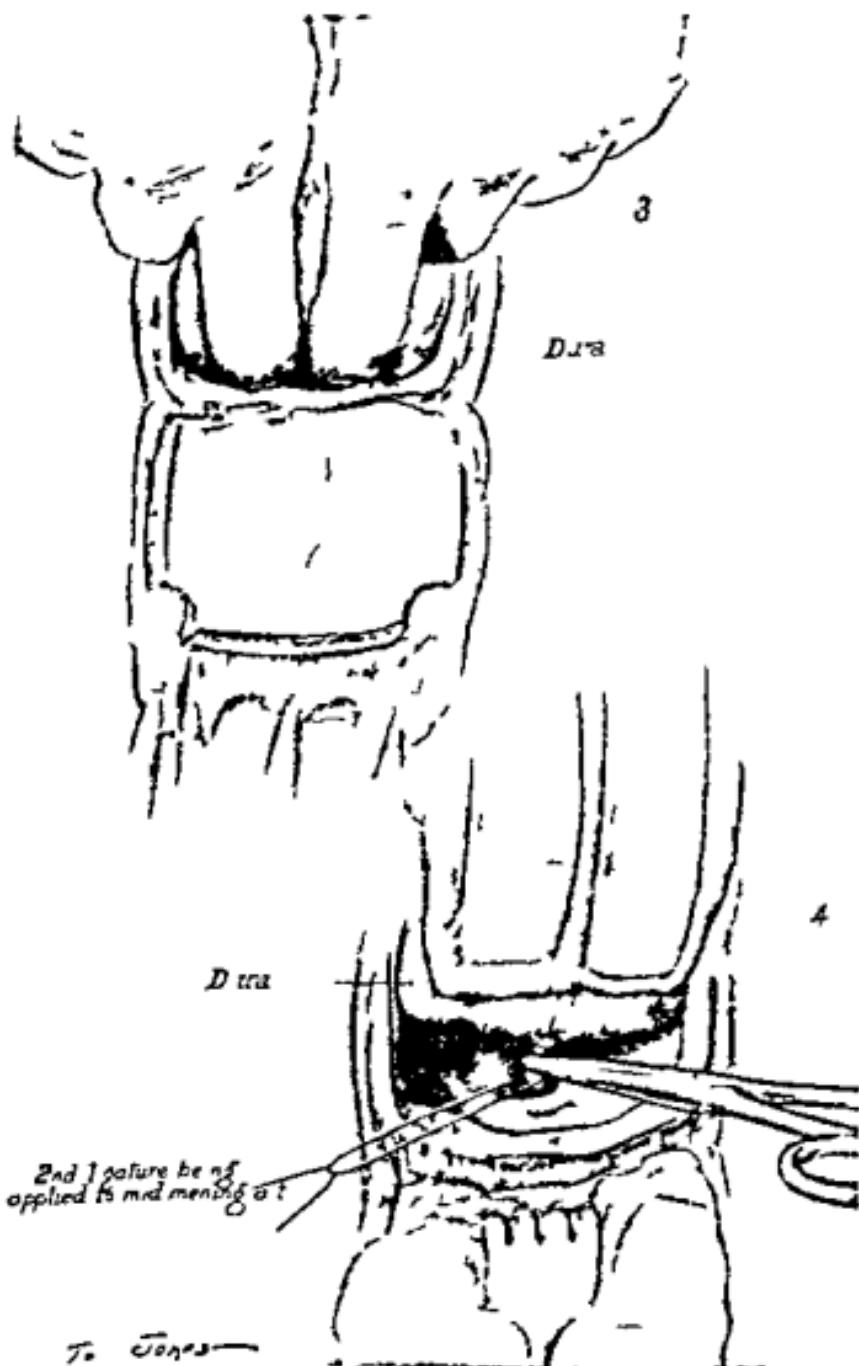


Fig 16-3 Osteoplastic flap turned down and finger inserted for the purpose of separating the dura from the bone. 4. Ligation of middle meningeal artery at foramen spinosum.

was closely connected with and apparently included the ganglion. It had a definite reddish fibrous capsule and was well defined, being attached only at the gasserian region. The tumor, on section, was found to be of firm consistence, and the cut surface was lusterous white, and striated. The mass was uniform in these respects throughout. Microscopic sections showed the type of cell for the most part, to be elongated, narrow, and oval. However, in certain places the cells are almost round. The elongated cells are parallel. In some regions the connective tissue stroma is rich and the tumor cells occur in patches of alveolar formation about the vessels. In other places the field is almost entirely made up of tumor cells. A rare mitotic figure is seen. No giant cells are found. There are fibrils, free from the cells, varying from fine to coarse, and in places forming a tangle. The fibrils are not markedly numerous.

It seems to be difficult to decide on the nature of the growth removed. Sections of the tumor were studied by different pathologists, and the diagnoses suggested were neurofibroma, fibrosarcoma, and endothelioma. In other reported cases of tumor of the gasserian ganglion the pathologists have not always agreed upon the nature of the growth. Sachs, in reporting his case in the Annals of Surgery, August, 1917, classified the tumor as most probably being an endothelioma. Sachs writes "A considerable number of these tumors have been studied pathologically. In the last fifty two years the literature contains 37 cases. These have been reviewed with particular care as to their pathology by Marchand and Giani. Though various diagnoses have been made in these cases, varying from carcinoma to sarcoma and endothelioma, the consensus of opinion has been to call them endotheliomata. It seems probable that at least some of these cases called carcinoma belonged to the endotheliomata."

Convalescence—There were no symptoms of shock following operation, and the patient made a good convalescence. He had been taking from 2 to 3½ grains of morphin daily previous to operation, and required some morphin for about one week following operation. The wound healed kindly and stitches were removed on the eighth day. A couple of days later the wound

ganglion, as it lies in too close relation with the cavernous sinus. The dura is now separated from the upper surface of the ganglion by means of this blunt dissector. The escape of the cerebro-spinal fluid which you now see indicates that the dura has been opened during this dissection. What is left of the ganglion is now removed by grasping it toward its posterior portion with a pair of hemostatic forceps and making traction along the axis of the nerve. This extracts the ganglion together with a portion of its root. The hemorrhage is quite free now but will probably stop after tamponing the bleeding area with gauze for a few minutes. If it does not cease in a few minutes from the picking the end of this gauze pack will be brought out from the angle of the wound and the pack left in place for twenty four hours. We will now remove this tampon which has been in place for about five minutes. You see the hemorrhage has ceased entirely so we may close the wound without drainage. The retractors holding the brain upward are now removed and the brain allowed to settle down into the middle fossa of the skull again. It is rather slow in doing so but within a few minutes it will settle down into place. In this case the bone-flap will be left out and in addition to that I will enlarge the opening in the skull with the bone biting forceps working posteriorly and low down. This is done for the purpose of making a permanent decompression. This tumor is undoubtedly malignant and the chances are that there will be a recurrence and the patient will live longer and be more comfortable with the decompression than without it. The wound is now closed without drainage.

The eye on the side where the ganglion has been removed will require special attention for some time to avoid irritation and ulceration. I will place these two silk sutures in the lids to keep the eye closed for a few days. After the stitches are removed from the lids the eye will be protected by a watch glass shield held in place by adhesive plaster. The eye will also be irrigated frequently with boric acid solution. These precautions are usually sufficient to prevent ulceration of the cornea.

Tumor — The growth was 3.5 x 2.5 x 1 cm in size and was constricted somewhat at its center (Fig. 177 6). The tumor

CLINIC OF DR DANIEL N LISI VDRATH

COOK COUNTY HOSPITAL

INJURIES OF THE CHEST IN CIVIL LIFE AND WAR

Summary Presentation of 5 cases illustrating the diagnosis complications and treatment of fracture of ribs hemorrhage pneumothorax serous and traumatic intrapleural effusions emphysema and the late complications resulting from fibrous tissue development and contracture in thoracic wounds a summary of battle field surgery of the chest as developed on the West front

I DESIRE to show you today 5 cases illustrating various phases of injuries of the chest as we observe them in a large metropolitan hospital i.e. the injuries of civil life After presenting the chief features of these cases I will review some of the principal features of war surgery of the chest

Summary of Case I — Multiple fracture of ribs hemopneumothorax with pressure symptoms on heart and mediastinum extreme subcutaneous emphysema multiple aspirations of chest recovery

The first patient is a man fifty eight years of age who was brought to the hospital four weeks ago after falling from a ladder a distance of about 12 feet and striking the left side of his chest I examined him about three hours after the injury and found a false point of motion over the seventh eighth and ninth ribs from the axillary line to the spine indicating multiple fractures of these ribs a finding which was later confirmed by x-ray examination In addition to these evidences of fractures I found a wide spread subcutaneous emphysema extending from the median line behind to the median line in front and from the clavicle above almost to the costal arch below The lips and nail beds had a distinct cyanotic tinge and there was marked dyspnea The pulse was rapid (120) and small and there was slight hemoptysis Percussion showed an area of dulness about the width

began to drain serum through a couple of stitch holes. The drainage persisted for a number of days. The patient left the hospital about four weeks after operation, free from pain for the first time in nearly two years. I have heard nothing of his progress since leaving the hospital. A recent letter of inquiry while not returned, brought no response.

CLINIC OF DR. DANIEL N. LISLNDRATH

COOK COUNTY HOSPITAL

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INJURIES OF THE CHEST IN CIVIL LIFE AND WAR

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of three fingers at the lower portion of the chest, and above this a markedly tympanitic sound. The heart was displaced greatly toward the right.

Our diagnosis was multiple fracture of the ribs with injury to the lung, which resulted in the escape of blood and air into

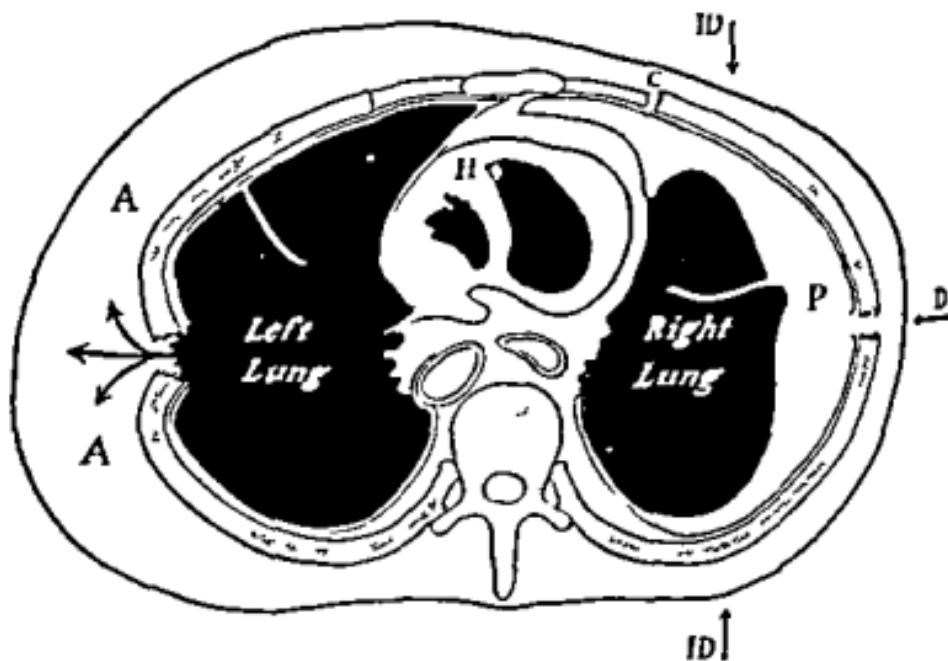


Fig. 178.—Cross-section of the thorax. In schematic, to show mode of production of pneumothorax or hemothorax and of subcutaneous emphysema as a result of fractures of the ribs. *ID*. The arrow accompanying these letters shows the mode of action of indirect force in producing fracture of the ribs. *D*. Mode of action of direct force in producing fracture of the ribs. *P*. Pneumothorax as a result of fracture of the rib and laceration of the pleura on right side. *A*. Extensive subcutaneous emphysema as a result of puncture of a lung by the sharp ends of a fractured rib fragment. The triple arrow shows the mode of egress of the air from the punctured lung into the subcutaneous tissues. *H*. Cross-section of heart. *C*. Fracture at costochondral junction without displacement. (Keen's Surgery.)

the pleural cavity and gave rise to the physical findings of hemo-pneumothorax just described and also allowing the escape of air into the subcutaneous tissues of the chest wall.

In connection with the diagnosis of this case let me emphasize at this time the great value of a fluoroscopic examination of the chest combined if possible with plates taken by the stereo-

scopic method. The x-ray examination of the patient at the time of admission to the hospital showed a collapse of the left lung and a displacement of the heart and mediastinum toward the right. There was a moderate amount of fluid at the lower portion of the left pleural cavity, and above this (Fig. 178) the extreme clearness of the chest picture showed that the major portion of the displacement of the heart and mediastinum as well as of the lung collapse was due to a very marked pneumothorax.

On account of the absence of communication of such a hemo-pneumothorax with the external air it is commonly spoken of as a closed one to distinguish it from a similar condition where there is a free communication between the pleural cavity and the external air, to which the term "open pneumothorax" is applied. Of course you must remember in connection with the latter term that an open pneumothorax may be converted spontaneously into a closed one if the wound of communication between the pleural cavity and external air becomes sealed during the healing process or if it is artificially closed by gauze packing or by an operation which brings the soft parts into approximation and converts the open into a closed pneumothorax.

Our first treatment of this patient was to apply strips of adhesive plaster in the customary "shingle" fashion over the left side of the chest so as to completely immobilize it, and then we gave him morphin which is a sovereign remedy for such cases. In spite of this treatment the dyspnea and cyanosis increased to such an extent within the first forty eight hours that it was necessary to remove the adhesive strips and re-examine the chest. We found that the respiratory distress was due to a marked increase in the amount of air in the pleural cavity, but the quantity of fluid had increased but little. In order to relieve his symptoms we aspirated a large amount of air and a much smaller quantity of fluid through the sixth interspace in the axillary line with the ordinary Dieulafoy aspiration apparatus. The relief was immediate so that the lips and finger nails became of a reddish tinge and the dyspnea disappeared completely.

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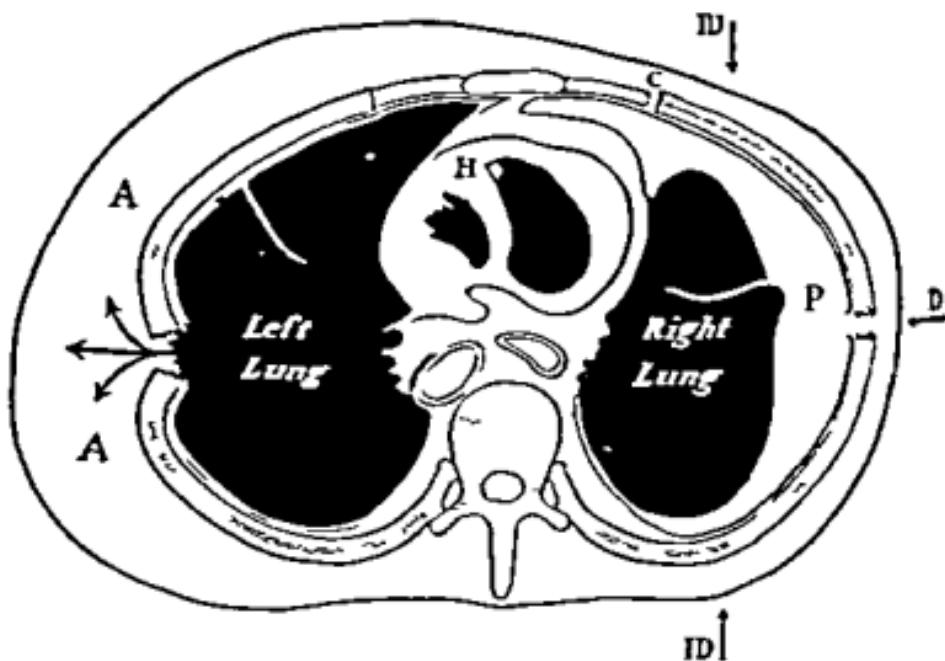


FIG. 1.—Cross-section of thorax diaphragmatic to show mode of production of pneumothorax or hemothorax and of subcutaneous emphysema as a result of fractures of the ribs. *ID*—The arrow accompanying these letters shows the mode of action of indirect force in producing fracture of the ribs. *D*—mode of action of direct force in producing fracture of the ribs. *P*—pneumothorax as a result of fracture of the rib and laceration of the pleura or costal side. *H*—extreme subcutaneous emphysema as a result of puncture of a lung by the sharp end of a fractured rib fragment; the triple arrow shows the mode of entry of the air from the punctured lung into the subcutaneous tissues. *H*—cross-section of heart. *C*—fracture at costochondral junction with heart displacement. Keen & Curran.

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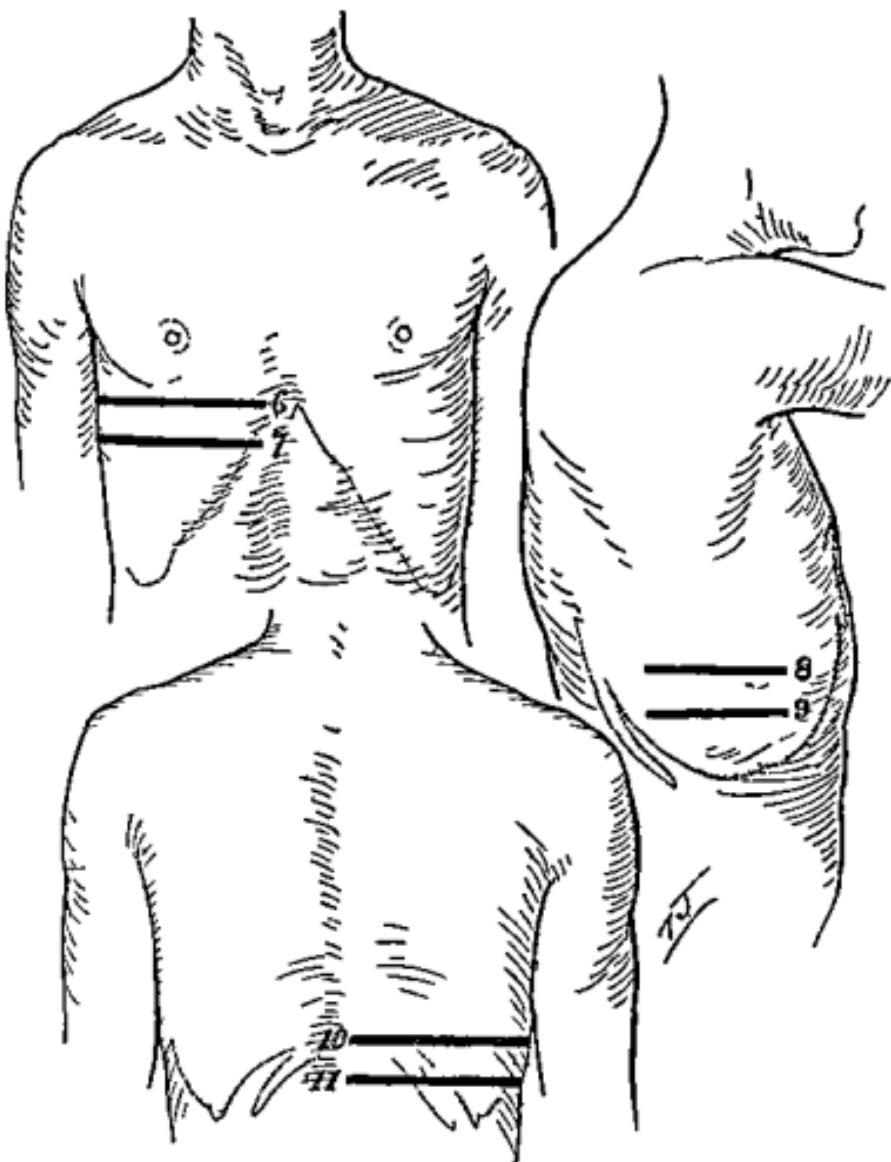


Fig 179.—Anterior-posterior and lateral views of thorax showing normal range of respiratory mobility of lower border of lung in the costophrenic sinus. The absence of a change in percussion note at these levels upon deep inspiration is a very valuable sign in subphrenic abscess. (From Surgical Clinics of Chicago Vol I, No 5 Oct, 1917.)

absorbing both blood and air and is becoming the standard method of treatment of such cases. The subcutaneous emphysema such as was found in this patient requires no special treat-

We did not reapply the adhesive plaster, but substituted for it a firm, wide muslin bandage completely encircling the chest.

This first aspiration was followed by three days of comparative comfort, but the dyspnea recurred at the end of this time, and fluoroscopic examination showed that the effusion had accumulated to a considerably greater extent than the air in the pleural cavity. There was less displacement of the heart and mediastinum than had been the case when the pneumothorax condition predominated. At the second aspiration we obtained about 250 c.c. of a bloody, serous fluid.

In this connection let me call attention to the fact that the term "hemothorax" is a misnomer, in many cases the condition is, in reality, a serothorax, the fluid being of a serous character rather than a bloody one, due to the response on the part of the pleura to the inflammatory reaction called forth by a trauma.

Following the second aspiration the dyspnea and other symptoms did not recur. The subcutaneous emphysema disappeared rapidly the first week after injury.

The patient from this time on made an uneventful recovery and as you will see from the examination today, four weeks after the injury there is practically no trace of his hemopneumothorax.

This case teaches two important things. First the great value of the x ray in the diagnosis and subsequent control of the progress of serious injuries of the chest, second, the necessity of repeated aspirations of the pleural cavity in cases of either pure hemo- or pure pneumothorax or as is more frequently the case of the association of these two conditions. There are many who believe that the chest should not be aspirated unless there are symptoms of pressure in extreme displacement of the heart and other mediastinal contents. It is my opinion however, and this is confirmed by the majority of surgeons during the present war that one should not wait until such extreme displacement has occurred but rather anticipate the more serious effects of the displacement due to a hemopneumothorax by aspirations of the chest at more or less regular intervals. This method of treatment assists the pleura in

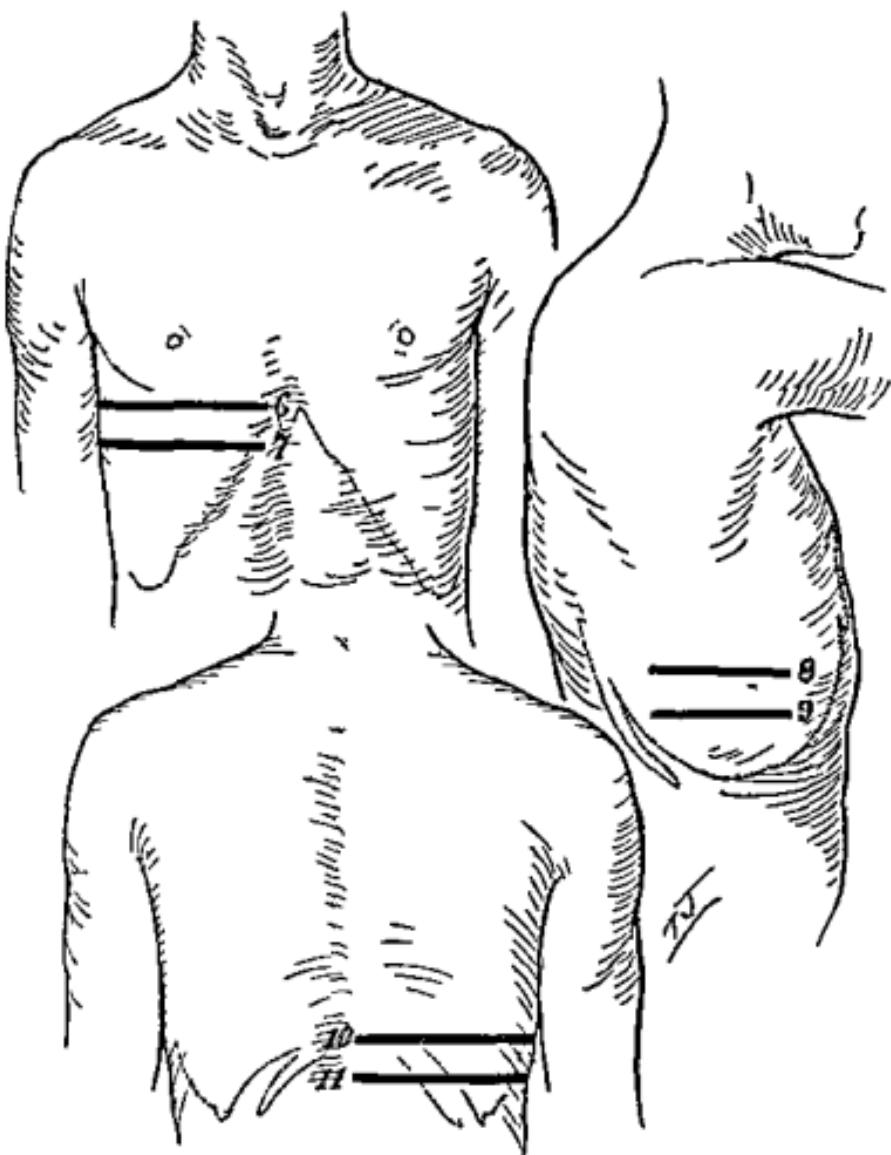


Fig 179.—Anterior, posterior and lateral views of thorax showing normal range of respiratory mobility of lower border of lung in the costophrenic sinus. The absence of a change in percussion note at these levels upon deep inspiration is a very valuable sign in subphrenic abscess. (From Surgical Clinics of Chicago Vol I, No 5 Oct 1917.)

absorbing both blood and air and is becoming the standard method of treatment of such cases. The subcutaneous emphysema such as was found in this patient requires no special treat

ment, as the air is quickly absorbed within the first week after injury. It is only when exceptional cases such as are illustrated in Fig. 179 occur that more active operative interference must be carried out. Under these circumstances a rib which is impinging upon the lung and allows air to be pumped constantly into the subcutaneous tissues demands an immediate thoracotomy and the release of the lung in order to save the patient from the disastrous effects of a wide spread subcutaneous emphysema resulting in death from asphyxiation due to the fact that the air gets into the submucous tissues of the larynx and causes occlusion of the glottis.

Summary of Case II—Stab wound of abdomen. Kick over left side of chest followed by extreme degree of hemothorax, causing heart to be displaced to right. Multiple aspirations of bloody fluid. Recovery retarded by pleural thickening and immobility of the diaphragm. Consideration of concussion and subparietal injuries of the chest.

This patient is a boy of nineteen who entered the hospital three months ago. He had been stabbed in the left upper quadrant of the abdomen about an hour before admission and kicked over the left axillary region. Examination of the chest failed to show any external evidences of injury and no fracture of the ribs of the injured side of the chest. On percussion an area of dulness the width of two fingers was found extending horizontally around the lower portion of the left side of the chest and there was an absence of the normal respiratory excursion of the lung into the costophrenic sinus. Under normal conditions if one percusses at the sixth rib in the mammary line at the eighth rib in the midaxillary line and at the tenth rib in the scapular line (Fig. 179) you will notice that the lung resonance ceases. When the patient is now asked to take a deep breath the pulmonary resonance extends down to the seventh, ninth and eleventh ribs respectively because the lower borders of both lungs dip down into the costophrenic sinus during inspiration. The absence of this normal respiratory excursion or its replacement by dulness I have found to be one of the earliest evidences of pleural effusion and on the right side of subphrenic abscess.

This absence of respiratory excursion of the lung into the costophrenic sinus was very marked in our patient but no special significance was ascribed to it at this time. Immediate exploratory laparotomy revealed the fact that the stab wound had penetrated the abdominal wall but had not caused any visceral or diaphragmatic injury.

The postoperative course was uneventful until the fifth day when the patient complained of great difficulty in breathing and

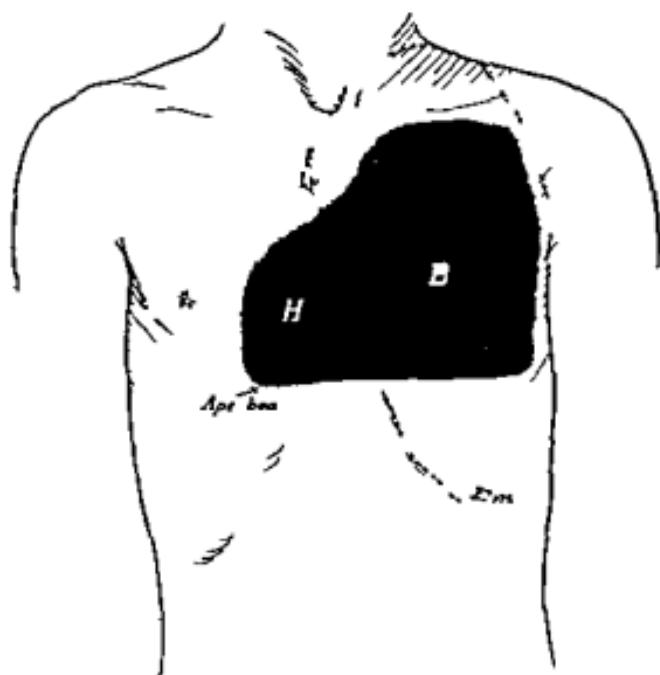


Fig. 180.—Left hemothorax with displacement of the heart to the right. *B* Area of dulness due to left-sided hemothorax. *H* Area of dulness behind and to right of sternum due to displaced heart. Note position of apex beat in right parasternal line. *Em* Median and lower lines of subcutaneous emphysema.

distinct cyanosis was noticeable. There were no evidences of peritonitis but examination of the chest showed an absence of respiratory movement and flatness with absence of the respiratory and voice sounds over the entire left side of the chest. The apex beat was to be felt in the fifth interspace in the right parasternal line the cardiac dulness merging with that present over the left side of the chest (Fig. 180). The patient was fluoro-

ment, as the air is quickly absorbed within the first week after injury. It is only when exceptional cases such as are illustrated in Fig. 179 occur that more active operative interference must be carried out. Under these circumstances a rib which is impinging upon the lung and allows air to be pumped constantly into the subcutaneous tissues demands an immediate thoracotomy and the release of the lung in order to save the patient from the disastrous effects of a wide-spread subcutaneous emphysema, resulting in death from asphyxiation, due to the fact that the air gets into the submucous tissues of the larynx and causes occlusion of the glottis.

Summary of Case II—Stab wound of abdomen. Kick over left side of chest followed by extreme degree of hemothorax, causing heart to be displaced to right. Multiple aspirations of bloody fluid. Recovery retarded by pleural thickening and immobility of the diaphragm. Consideration of concussion and subparietal injuries of the chest.

This patient is a boy of nineteen who entered the hospital three months ago. He had been stabbed in the left upper quadrant of the abdomen about an hour before admission, and kicked over the left axillary region. Examination of the chest failed to show any external evidences of injury and no fracture of the ribs of the injured side of the chest. On percussion an area of dulness the width of two fingers was found extending horizontally around the lower portion of the left side of the chest and there was an absence of the normal respiratory excursion of the lung into the costophrenic sinus. Under normal conditions if one percusses at the sixth rib in the mammary line at the eighth rib in the midaxillary line and at the tenth rib in the scapular line (Fig. 179) you will notice that the lung resonance ceases. When the patient is now asked to take a deep breath the pulmonary resonance extends down to the seventh ninth, and eleventh ribs respectively because the lower borders of both lungs dip down into the costophrenic sinus during inspiration. The absence of this normal respiratory excursion or its replacement by dulness I have found to be one of the earliest evidences of pleural effusion, and on the right side of subphrenic abscess.

blood from the left pleural cavity. This was followed by rapid improvement of the dyspnea and cyanosis and in a x-ray examination a few days later confirmed the return of the heart toward the left. About two weeks after this first aspiration there was a recurrence of symptoms necessitating a second aspiration of about 300 cc of bloody fluid. No further aspirations were necessary but the patient continued to complain for some months of pain over the left side and subsequent x-ray examinations showed some opacity due to thickening of the pleura (Fig 181) and a very slow return to normal of the movements of the left half of the diaphragm. The expansion of the collapsed left lung was greatly aided by the employment of respiratory gymnastics especially blowing liquid from one bottle into a second one and then back again into the first one a method commonly used in the after treatment of cases of empyema.

There are a number of interesting features in this case. First there were a number of external evidences of injuries to the chest but exploration of the abdomen had failed to reveal any wound of the diaphragm a condition which must always be looked for in every stab or gunshot wound of the upper abdomen. The case therefore belongs to a class similar to the subparietal injuries of the abdominal viscera often called injuries without external signs. In the abdomen you are all familiar with the fact that rupture of both solid and hollow viscera may follow a blow upon the abdominal wall or a crushing between cars etc without any evidence to be seen on the skin other than perhaps a slight abrasion or contusion. The fact that similar severe injuries can occur in the chest following a blow or crushing force is not as well known as it deserves to be and had it not been for our knowledge of the occurrence of such injuries we would not have been able to properly interpret the dyspnea and other evidences of the hemothorax which this patient showed a few days after injury.

In this connection let me again emphasize the great value of repeated x-ray examinations both in civil and in war practice after injuries of the chest and I will refer later to an article by

scoped at once and stereoscopic x-ray plates made. They showed a very dense and diffuse shadow over the entire left



FIG. 181.—Hemothorax of left side; placed heart to the right. R. Heber
March 1st.

side of the chest with marked displacement of the heart to the right. On account of the density of the shadow we made a diagnosis of hemothorax and aspirated 500 c.c. of dark liquid

injuries of the chest to which our patient belongs, there is, similarly, no evidence of fracture or wounds of the soft parts. Effusions into the pleural cavity are not likely to accompany this condition. At autopsy the only findings are multiple punctate hemorrhages throughout the lung and on the surface of the pleura and pericardium. There is, of course, no special treatment for this condition except rest and sedatives.

In the patient whom I have just presented the abdominal stab wound remained in the background as far as clinical symptoms were concerned, and we were dealing chiefly with a non-infected hemothorax of enormous size causing displacement of the heart and other mediastinal contents (Fig. 181).

In the early months of the present war the method of treatment of such cases was guided by the previous experience in civil practice, namely, not to aspirate the hemothorax unless there were pressure symptoms. Some of the English surgeons have become more radical and advise aspiration every few days on account of the after effects of the presence of such a large quantity of blood in the pleural cavity even if there are no signs of pressure.

Our patient of today shows the value, in my opinion, of this change in the method of treatment. A glance at an x ray (Fig. 182), taken recently, about four months after injury, will show a hazy condition of the entire left side, although the heart has returned to its normal position on the left side of the chest. This haziness of the left sided shadow is due no doubt in a considerable degree to the thickening of the pleura. Fluoroscopic examination has shown within the last few days that there is still a considerable lack of motion of the left side of the diaphragm, a condition which has frequently been observed by English surgeons following war injuries of the chest. The lung has apparently expanded to its fullest extent on the left side, as the percussion note over the entire chest and the respiration excursion is apparently normal in character.

Summary of Case III—Gunshot wound of right side of chest penetrating pleural cavity, lung, diaphragm, and liver. Example of combined thoracic and abdominal injuries. Neces-

Prinzip emphasizing this method of diagnosis in war injury of the chest.

There is another variety of injury of the chest or rather of the viscera contained therein to which Boenig was the first to



call attention and it has been termed a concussion or commotion of the thorax—a condition quite similar to concussion of the brain. The principal symptom is extremely rapid action of the heart with hemoptysis and dyspnea. As in the case of

of one of the solid abdominal viscera. The skin surrounding the thoracic wound was painted with tincture of iodin and an aseptic dressing applied as we felt that the maximum damage had occurred in the area below the diaphragm. An incision was made over the location of the bullet and about 3 inches of the seventh

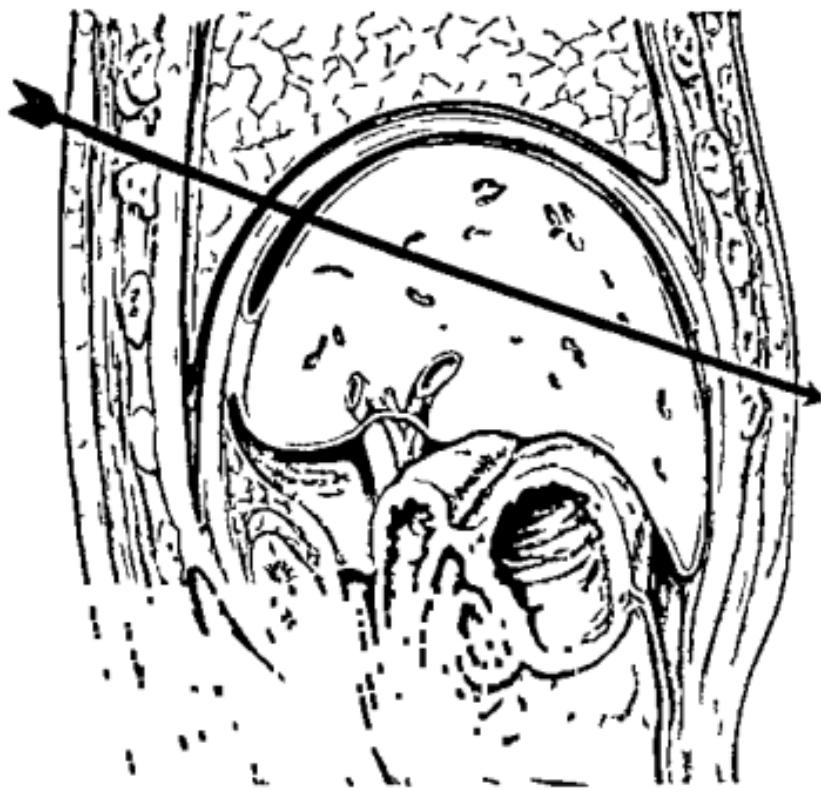


Fig. 184.—Sagittal section showing course of bullet in Case II. The arrow indicates the manner in which bullet entered posterior portion of chest between sixth and seventh ribs, penetrated the pleural cavity, lung, diaphragm, liver and anterior abdominal wall, and was found close to skin just above right costal arch in mammary line.

rib was resected in the mammary line and the peritoneal or rather the subphrenic space opened. By using the rib spreader which is an indispensable instrument in thoracic operations we were able to obtain adequate exposure of an extensive bullet wound traversing (Figs. 184 and 185) the entire right lobe of the liver from its convexity to a point close to the lower border

sity of thorough examination of such cases both from thoracic and abdominal modes of approach. Tamponade of liver. Consideration of treatment of injuries of diaphragm.

I desire to present to you a third case of injury of the chest differing from the first and second non penetrating injuries through the fact that it belongs to the class of penetrating injuries with external wound. The patient is thirty five years of age.

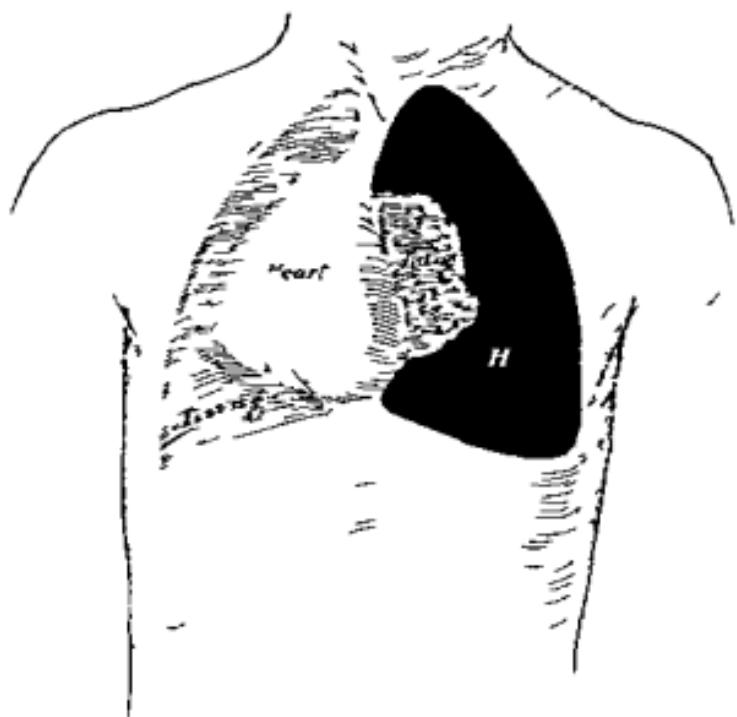


Fig. 183.—Sectional view of conditions found in Case II. H Left hemothorax causing collapse of left lung, and displacement of heart and mediastinum to the right.

male and was brought to the hospital two weeks ago after being shot by a policeman. Examination revealed the fact that there was a wound of entrance close to the spine at the lower end of the right scapula and no wound of exit. The bullet could be felt in the mammary line lying beneath the skin close to the right costal arch. The patient presented the picture of a severe internal hemorrhage so that we felt certain of the fact that there had been a penetration of the diaphragm with injur

of one of the solid abdominal viscera. The skin surrounding the thoracic wound was painted with tincture of iodin and an aseptic dressing applied as we felt that the maximum damage had occurred in the area below the diaphragm. An incision was made over the location of the bullet and about 3 inches of the seventh

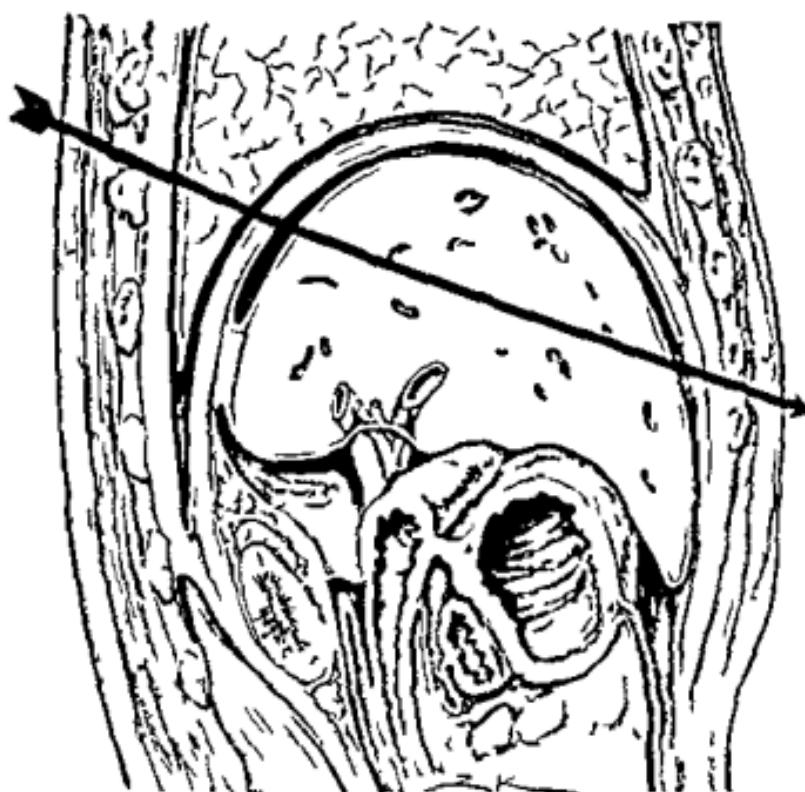


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of the right lobe. The abdominal cavity contained a large quantity of blood and there was still free bleeding from the track of the missile. Suturing the liver substance under these conditions, even by the use of mattress sutures is not practicable, inasmuch as the liver tissue is so brittle that such sutures

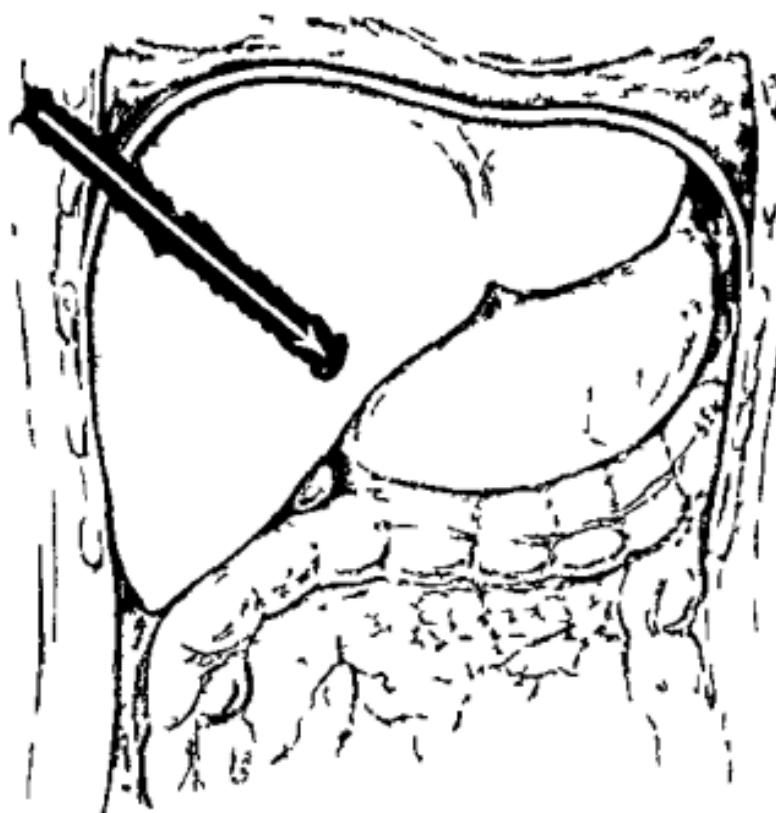


Fig 185.—Anterior view indicating course of bullet in Case II. Note ragged character of wound along course of projectile.

will not hold. Hence we were obliged to resort to firm packing of the wound in the liver with gauze. You can form a conception of the extent of the wound in the liver when I tell you that it required 25 yards of gauze (1 yard wide but folded) to control the hemorrhage. I can warmly recommend packing liver wounds and believe that no time should be lost in attempting a suture of such cases.

We did not have time to examine the condition of the dia-

phragm further than to see that it was extensively lacerated, but owing to the condition of the patient were not able to suture it

The gauze packing was removed at the end of five days and a slight secondary hemorrhage required a repacking of the wound. His anemia has almost completely disappeared and his wound now appears clean. Nearly all of the gauze packing has been removed and recovery seems almost certain.

This case emphasizes the necessity of a thorough examination of combined thoracic and abdominal injuries. This is true both in the case of simple penetrating injuries as we encounter them in civil practice as well as of more extensive shell wound injuries as they are met with during the present war.

I shall speak later of the more radical procedures advocated by both French and English surgeons in the treatment of such combined thoracic and abdominal injuries especially of the repair of the laceration of the diaphragm and the conversion of an open pneumothorax into a closed pneumothorax. It may be said at this time that of the two methods of approach for abdominal injuries which complicate thoracic injuries one should never attempt to do more than investigate and treat the injury of the diaphragm or possibly of the liver from the thoracic side. The preferable method of approach for abdominal injuries should be the same as exists for the abdominal injuries of civil practice viz one of the abdominal incisions. Let this case therefore be a warning to watch every case of penetrating injury of the thorax carefully for evidences of abdominal injuries so that valuable time will not be lost in making a diagnosis of injury to a solid or hollow abdominal viscous.

Summary of Case IV—Stab wound of upper lobe of left lung. Diagnosis of penetration of lung made by presence of external subcutaneous emphysema over entire left side of chest.

This patient presents no unusual features except the presence of a wide spread subcutaneous emphysema extending from the lateral regions of the neck above almost to the costal arch below, over the entire left side of the chest. He was stabbed last evening in the supraclavicular region : e over the apex of the left lung. The chief question which arose was whether

of the right lobe. The abdominal cavity contained a large quantity of blood and there was still free bleeding from the track of the missile. Suturing the liver substance under these conditions, even by the use of mattress sutures, is not practicable, inasmuch as the liver tissue is so brittle that such sutures

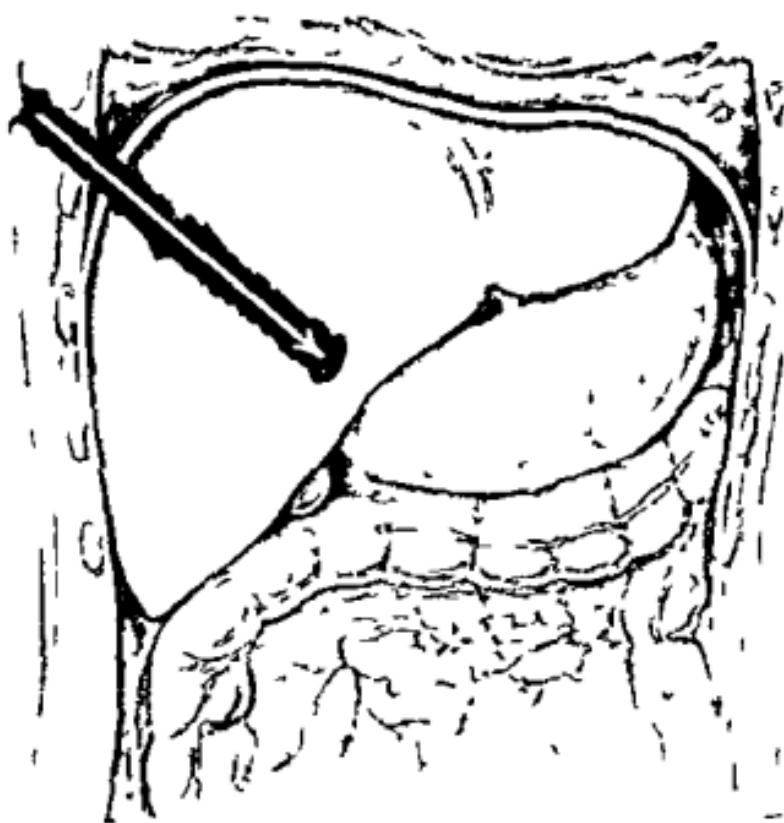


Fig. 180.—Interior view indicating course of bullet in Case II. Note ragged character of wound along course of projectile.

will not hold. Hence we were obliged to resort to firm packing of the wound in the liver with gauze. You can form a conception of the extent of the wound in the liver when I tell you that it required 25 yards of gauze (1 yard wide, but folded) to control the hemorrhage. I can warmly recommend packing liver wounds, and believe that no time should be lost in attempting a suture of such cases.

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I shall speak later of the more radical procedures advocated by both French and English surgeons in the treatment of such combined thoracic and abdominal injuries especially of the repair of the laceration of the diaphragm and the conversion of an open pneumothorax into a closed pneumothorax It may be said at this time that of the two methods of approach for abdominal injuries which complicate thoracic injuries one should never attempt to do more than investigate and treat the injury of the diaphragm or possibly of the liver from the thoracic side The preferable method of approach for abdominal injuries should be the same as exists for the abdominal injuries of civil practice viz one of the abdominal incisions Let this case therefore be a warning to watch every case of penetrating injury of the thorax carefully for evidences of abdominal injuries so that valuable time will not be lost in making a diagnosis of injury to a solid or hollow abdominal viscus

Summary of Case IV—Stab wound of upper lobe of left lung Diagnosis of penetration of lung made by presence of external subcutaneous emphysema over entire left side of chest

This patient presents no unusual features except the presence of a wide-spread subcutaneous emphysema extending from the lateral regions of the neck above almost to the costal arch below, over the entire left side of the chest He was stabbed last evening in the supraclavicular region *i.e.*, over the apex of the left lung The chief question which arose was whether

of the right lobe. The abdominal cavity contained a large quantity of blood and there was still free bleeding from the track of the missile. Suturing the liver substance under these conditions even by the use of mattress sutures is not practicable inasmuch as the liver tissue is so brittle that such sutures

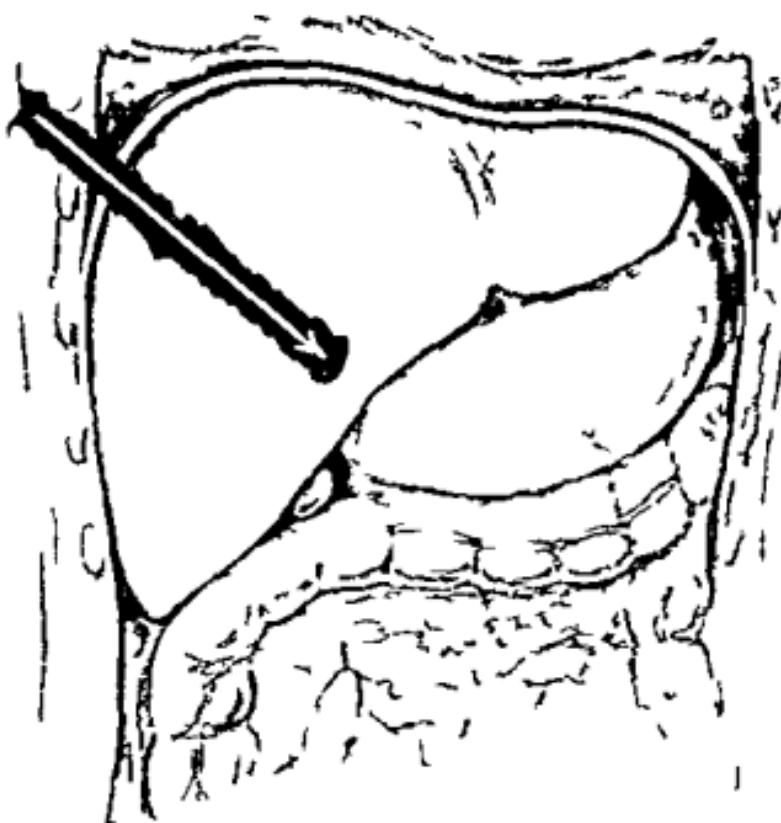


FIG. 18. Anterior view indicating course of bullet in Case II. Note ragged character of wound along course of projectile.

will not hold. Hence we were obliged to resort to firm packing of the wound in the liver with gauze. You can form a conception of the extent of the wound in the liver when I tell you that it required 2½ yards of gauze (1 yard wide but folded) to control the hemorrhage. I can warmly recommend packing liver wound and believe that no time should be lost in attempting a suture of such cases.

We did not have time to examine the condition of the dia-

Fever persisted in this case for nearly two months, and we felt certain at times that we were dealing with an infected hemothorax, but cultures made from fluid obtained by exploratory puncture showed the effusion to be sterile. Several of the English surgeons have called attention to this persistent rise of temperature in cases of non infected hemothorax following war injuries, and I shall refer to this later. This case shows the necessity of making careful bacteriologic examination of the fluid obtained by aspiration or exploratory puncture in cases of hemothorax when fever is present.

Observations of chest wounds during the present war has taught us much in regard to methods of diagnosis and treatment. Under the head of diagnosis the value of early x ray examination and the control of the progress of the case by repeated fluoroscopic examinations has revolutionized all other methods. Our views in regard to treatment of chest wounds have undergone radical changes as the result of the experience of the past four years. I refer especially to the following subdivisions of the subject:

1 The treatment of combined abdominal and thoracic injuries

2 The treatment of non infected and infected closed hemothorax

3 The treatment of open pneumothorax an injury scarcely known before the use of explosive shells

4 The question of removal of projectiles

Great care has been taken to observe the combination of thoracic and abdominal injuries, advantage being taken of the experience of civil practice in cases similar to the one I have shown you today (Case III). The frequency of these combined injuries makes it necessary to keep in mind constantly the possibility of a perforation of one of the solid or hollow abdominal viscera in every case in which the wound of entrance is above the diaphragm. Injuries of the latter are of course, readily recognized when the wound of entrance is quite large as in the case in an open pneumothorax (see Fig 188). In such an injury the preferable method of treating the wound in the diaphragm

the wound had penetrated the chest wall and injured the lung also. There were no evidences of severing of the nerves or blood vessels at this portion of the neck. The presence of the wide-spread emphysema is a positive evidence of a penetration of the lung although no other symptoms, such as hemothorax or pneumothorax, are present. I am simply showing him in order to call your attention to the great value of symptoms such as hemoptysis, subcutaneous emphysema, hemothorax and pneumothorax, or pressure symptoms of intrathoracic injury. The patient will be carefully watched to see if any infections develop within the soft tissues or within the pleural cavity and he will be frequently fluoroscoped in order to watch for effusion within the pleural cavity. In other words, the treatment of such cases is one of watchful expectancy, the chief methods of control being the temperature and frequent x-ray examinations.

Summary of Case V—Stab wound of right side of chest with extensive serohemothorax and fever. Consideration of cases of fever following injuries of the chest, special attention being directed to the fact that fever may be present even though the effusion be not infected.

This patient is a man thirty years of age, who entered my service about three months ago with a stab wound of the right side of the chest, the wound of entry being in the fifth interspace in the midaxillary line. Examination within a few days after the injury revealed the presence of an extensive effusion within the right pleural cavity with displacement of the lung toward the left but with no marked signs of pressure, such as dyspnea or cyanosis as would occur with a left-sided effusion to the same degree. At the time the patient entered we were not in the habit of aspirating such cases as a routine measure which is our custom at the present time influenced as I have stated before by the experience of surgeons in the present war.

The case presented no unusual features until about two weeks after the injury, when he began to have elevation of temperature to 102° to 103° F. We made exploratory puncture on several occasions and obtained a thin serous bloody fluid, but cultures revealed the sterile nature of the fluid.

Fever persisted in this case for nearly two months, and we felt certain at times that we were dealing with an infected hemothorax, but cultures made from fluid obtained by exploratory puncture showed the effusion to be sterile. Several of the English surgeons have called attention to this persistent rise of temperature in cases of non infected hemothorax following war injuries, and I shall refer to this later. This case shows the necessity of making careful bacteriologic examination of the fluid obtained by aspiration or exploratory puncture in cases of hemothorax when fever is present.

Observations of chest wounds during the present war has taught us much in regard to methods of diagnosis and treatment. Under the head of diagnosis the value of early x ray examination and the control of the progress of the case by repeated fluoroscopic examinations has revolutionized all other methods. Our views in regard to treatment of chest wounds have undergone radical changes as the result of the experience of the past four years. I refer especially to the following subdivisions of the subject:

- 1 The treatment of combined abdominal and thoracic injuries.
- 2 The treatment of non infected and infected closed hemothorax.
- 3 The treatment of open pneumothorax an injury scarcely known before the use of explosive shells.
- 4 The question of removal of projectiles.

Great care has been taken to observe the combination of thoracic and abdominal injuries, advantage being taken of the experience of civil practice in cases similar to the one I have shown you today (Case III). The frequency of these combined injuries makes it necessary to keep in mind constantly the possibility of a perforation of one of the solid or hollow abdominal viscera in every case in which the wound of entrance is above the diaphragm. Injuries of the latter are, of course readily recognized when the wound of entrance is quite large, as in the case in an open pneumothorax (see Fig 188). In such an injury the preferable method of treating the wound in the diaphragm

is through the thoracic opening. In all other cases, where the wound of entrance is small in the thorax and observation of the



Fig. 186.—Combined thoracic and abdominal injuries. The arrow on the right side indicates the course of a projectile which first traverses the pleural cavity and lung and then penetrates the diaphragm and liver, and from these, in some cases, further into the hollow viscera of the abdomen. On the left the course is similar, but the projectile often penetrates the stomach or spleen.

case renders it probable that a perforation below the diaphragm has occurred, it is best to perform a laparotomy at the earliest possible moment and deal with the injury to the diaphragm

from below rather than to enlarge the thoracic opening. A glance at Fig. 186 will show you the close relationship of the structures above and below the diaphragm, and the present war has shown the necessity of most vigilant observation of all thoracic injuries for indications of abdominal mischief.

The treatment of non infected hemothorax during the early months of the present war differed but little from that which, as in Case II shown you today, was our custom for many years in civil life. This practice has been to abstain from any interference with a hemothorax as long as there were no evidences of infection or of pressure upon the heart and mediastinum. This expectant method has been gradually replaced by more active interference even in the non infected cases. In the absence of symptoms of displacement of the heart, etc. it is at the present time considered perfectly justifiable and, in fact indicated to aspirate at as early a period as possible after receipt of the injury, and to repeat the aspiration at intervals of three to five days controlling this procedure by repeated x-ray examination. In this connection let me remind you again of the fact that as in Case V, fever may be present in a non infected hemothorax for weeks and yet cultures of the fluid obtained by aspiration show no growth. This fever is undoubtedly the result of absorption and in some cases may lead to more radical methods not called for by the case, if it had been known to be sterile.

The treatment of infected cases of closed hemothorax has also undergone many changes. Thoracotomy is indicated at a comparatively early period in the history of such cases but the prolonged suppuration following free drainage of the infected blood within the pleural cavity has led to many efforts at primary sterilization. Depage and Tuffier have been the pioneers in this effort. Shortly after an infected hemothorax has been drained, solutions such as Carrel Dakin are instilled at regular intervals with the object of converting the infected pleural cavity into a sterile wound cavity. Whenever cultures show this to be the case the drainage-tube is removed and the wound in the thoracic wall closed. Both English and French surgeons strongly recommend this method in an effort to cut short the

exhaustion and other sequelæ of the prolonged suppuration so frequently found in these cases of infected hemothorax. The tendency in general, both in non infected and infected closed hemothorax cases, has been toward more radical procedures and the application to this field of the valuable experience secured in the primary sterilization of wounds of the extremities by the Carrel Dakin and similar methods.

What seems to me a most excellent way of treating these cases of septic hemothorax is that given by Campbell¹ in a recent article. He states that many cases of septic hemothorax in the early stage can be successfully treated by thoracotomy and careful removal of all fluid and clot, followed by washing out with Dakin's solution and complete closure of the pleural cavity. This treatment, however, is of no avail in half of the severe septic cases, and drainage is followed by long-continued fever and exhausting suppuration. He has found in a number of cases that his method is superior to any other for the severely septic cases. An x-ray examination is first made and any foreign body localized. Under a general anesthetic the wound is explored, the fractured portions of rib resected, and the wound sewn up if its condition allows. The pleural cavity is then drained in the usual fashion resecting about $3\frac{1}{2}$ inches of rib as far forward and as low as possible that is usually the eighth rib in the mid or anterior axillary line. Through this opening the cavity is explored, and an easily accessible foreign body and fragments of loose bone lying in the cavity or on the surface of the lung removed. Blood-clot and fibrin are swabbed out as far as possible, and any septa forming loculi broken down. The cavity is next washed out with a warm mixture of hydrogen peroxid and eusol, or Dakin's solution. A rubber tube of $\frac{1}{4}$ -inch internal diameter with a large lateral opening $\frac{1}{4}$ inch from one extremity, is then inserted, so that this end lies in the most dependent part of the pleural cavity when the patient is lying on the normal side, that is in the costovertebral recess behind the pericardium. Finally, the wound is loosely sewn up but no attempt is made to effect an air tight closure around the tube.

¹ Brit. Med. Jour., January 26, 1918 p. 109.

When the patient has recovered from the operation the size of the cavity is estimated by filling it carefully (but usually incompletely) with warmed Dakin's solution, and then emptying it. After this the cavity is filled through the tube every four hours to about one-third of its capacity or less with Dakin's solution. At the end of two hours another long tube is attached to the tube in the chest and the fluid siphoned out, the patient meanwhile lying on the sound side with the chest opening uppermost, or as nearly so as possible. The patient is told to

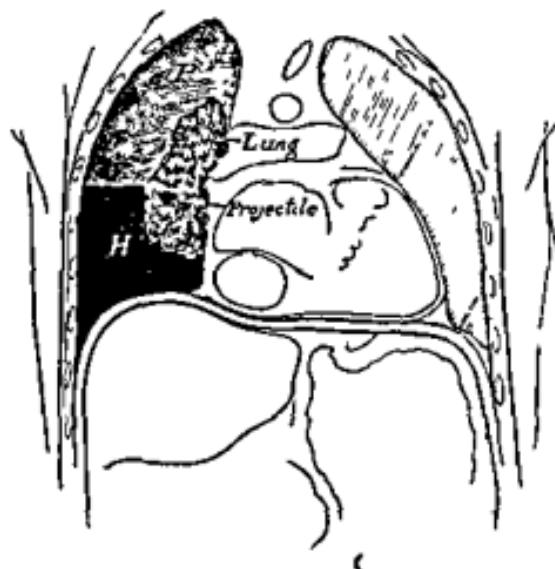


Fig 187.—Right closed hemopneumothorax with projectile in lung *H*. Hemothorax only partially filling the right pleural cavity *P*. Pneumothorax (closed) above the collection of blood in the right pleural cavity. Note collapsed right lung and position of projectile (dark area) in lung

pant or cough slightly at frequent intervals as long as the fluid remains in the chest, and by this means splash the fluid about inside the cavity, and so bathe with it the entire infected surface and any recesses that may exist. In this way the pleural cavity contains for two hours a large quantity of sodium hypochlorite solution and is more or less empty for a like time. During the former period the patient lies rigidly on the sound side, without any raising of the shoulders to prevent escape of the fluid and consequent flooding of the bed, during the latter

he is free to lie as he chooses. Thus the patient gets a reasonable amount of rest and comfort and is saved the exhaustion associated with the maintenance of one constant position. In addition, once daily the tube is removed, sterilized, and replaced, and the cavity washed out, as in the usual treatment for empyema. To overcome the disadvantage of injecting cold fluid into the chest, the author has found that it is better to make the Dakin's solution of double strength and, prior to filling, to dilute it with an equal quantity of warm sterile water.

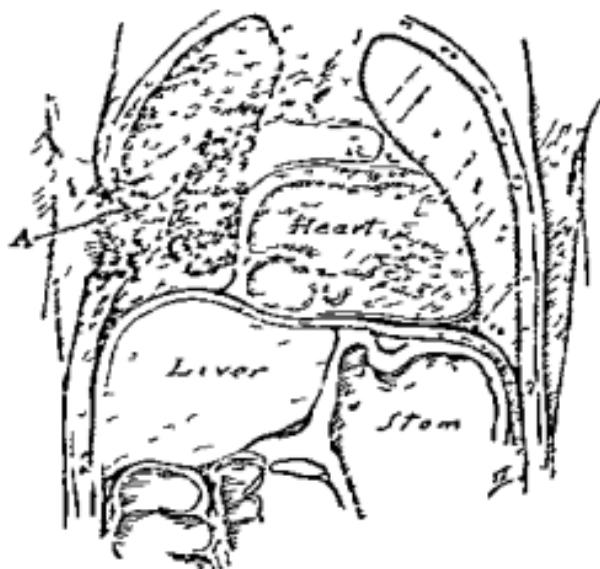


Fig. 188.—Open or "sucking" pneumothorax in a case of shell wound of the right side of the thorax. Note extensive destruction of soft tissues at point of entrance of the explosive shell and the rib fragments projecting into pleural cavity. Note also the collapse of the right lung. Many such severe injuries are complicated by (a) collapse of the opposite lung, (b) extensive injury of the diaphragm and abdominal viscera.

In the early months of the war the mortality from injuries of the chest due to the action of explosive shells was appalling. The resultant open or leaking pneumothorax (Fig. 188) was not actively treated until the latter half of 1916, when both French and English surgeons began to advocate early closure at the casualty clearing stations. Operation is especially indicated in these cases if (a) one suspects an injury of the diaphragm, (b) when an open pneumothorax (Fig. 188) exists, (c) where a

large missile has traversed the pleural cavity, whether lodged in the chest wall lung, mediastinum, or pericardium (Fig 189) The ragged soft parts must be first excised then all loose fragments of bone and foreign bodies, if larger than a filbert, removed, then the pleura and muscles are sutured and the open pneumothorax converted into a closed one In about 50 per cent of the cases no infection follows but if it does, the wound can be readily reopened and the case treated like one of infected hemothorax

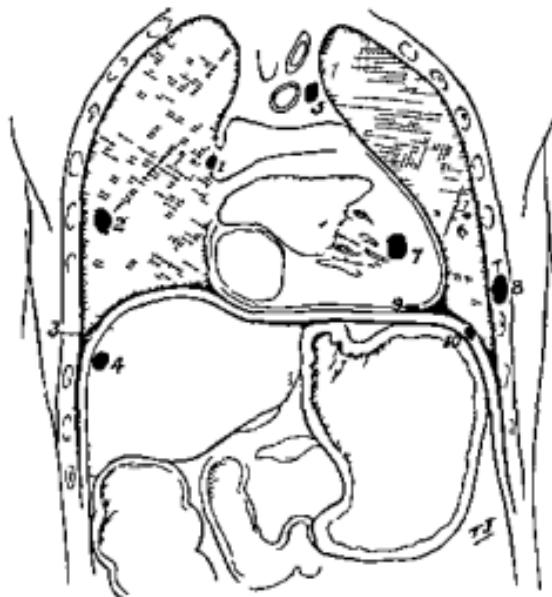


Fig 189.—Various locations of projectiles in the thoracic viscera 1 Deep in hilus of lung 2 Large projectile in parenchyma of lung 3 Free in pleural cavity 4 Near convexity of liver 5 In mediastinum 6 Small projectile just beneath pleura 7 In wall of left ventricle 8 In thoracic wall 9 In pericardium 10 In diaphragm

The question of the removal of projectiles is one which is far from being settled Many of the French surgeons like Duval Villeon, and others, believe that all projectiles no matter how small they are, should be removed Other surgeons take the stand that only those of larger size require removal the remainder will become encapsulated and never give rise to further trouble Duval has suggested a method which is quite extensively employed at the present time The projectile is

first localized by the Hertz compass and a rib resected over the area. The lung is then brought into the opening (Fig. 190) and held by a Collin forceps and an incision made over the projectile. As a rule no sutures are necessary for the lung.

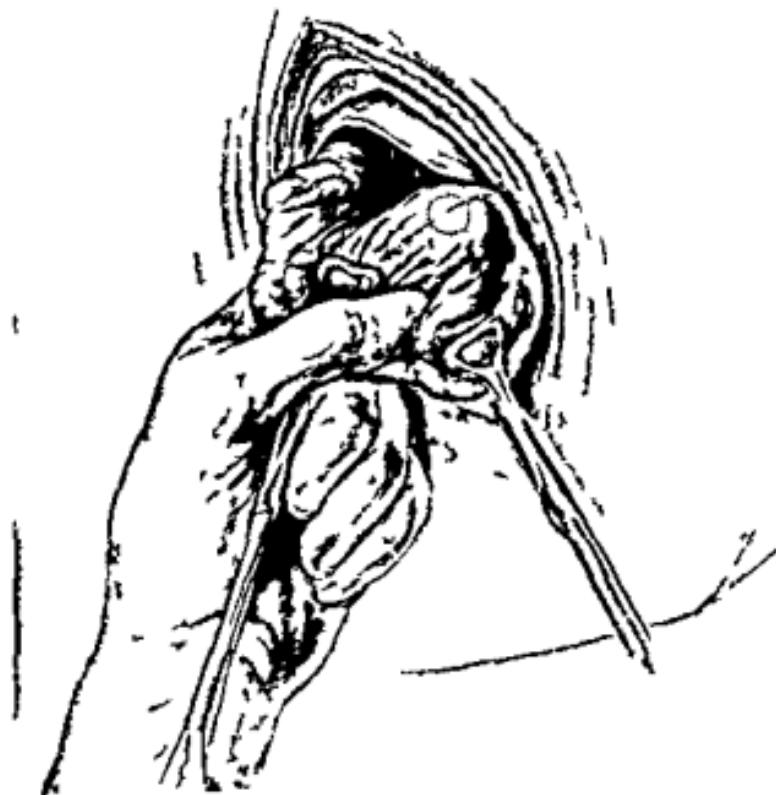


Fig. 190.—Removal of projectile from the lung. Duval. Note how lung is pulled out into opening in thoracic cavity and is held firmly by special forceps while an incision (dotted line) is made over the projectile.

The subject of war injuries of the thorax is one which is receiving such active consideration at the present time that a knowledge of the rapid advances made during the present war is most essential to the surgeon both in civil and military life.

CLINIC OF DR E W RYERSON

CHICAGO POLICLINIC HOSPITAL

BUNIONS

Summary Cause of bunions—the guilty shoe mechanics of bunion product on palliative treatment the Mayo operation—its disadvantages technic in present case—expected results

This woman's life has been made miserable for the last ten years by two large bunions. She was told a short time ago that an operation would relieve her and she at once consented to have it performed.

This deformity was caused solely by an improperly shaped shoe which pushed the big toe out of line and crowded it over toward the smaller toes. The heel of the shoe was too high and the foot slid downhill into the front of the shoe which was shaped like a funnel and not like a foot. The front of the shoe was neither broad enough nor long enough to allow the toes sufficient room and the pressure upon the big toe forced it diagonally backward against the head of the metatarsal bone. This pushed the metatarsal out of line inward toward the other foot increasing abnormally the space between the first and second metatarsal ends as is well shown in the x ray picture (Fig. 191).

The continued pressure of the metatarsal head against the side of the shoe caused a protective thickening of the overlying skin and it became painful and calloused. The fourth and fifth toes also suffered from too much pressure and corns developed upon them. The patient purchased some wider shoes wider across the ball of the foot but just as pointed and funnel shaped at the toe and the additional width over the ball allowed the metatarsal head to be pushed still further out of place. By this time the big toe was so far out of position that its proximal phalanx articulated only with the extreme outer portion of the

metatarsal head. The pressure and friction over the bunion caused a bursa to form between the skin and the metatarsal head and at intervals the bursa became irritated and inflamed and sometimes suppurated.

In some of the early text books on surgery this bursa was considered to be the actual bunion and its removal by operation



FIG. 191.—X Ray showing typical deformity in case of bunions. Dotted line indicates site and direction of incision with osteotome in the curative operation.

was recommended as a curative procedure. It should be recognized that the bursa is only the result of the hallux valgus and is simply a protective and defensive reaction against abnormal pressure.

The patient has experimented with various forms of conservative treatment for several years. A rubber cover was made by a chiropodist to fit over the painful area. This gave slight relief from the friction but macerated the skin. Pads were applied

between the toes to force the big toe inward toward the other foot but there was not room enough in the shoe for a straight toe and the pads and toe-posts simply caused increased pain Of late the toe has become fixed in its valgus position and cannot be straightened by muscular action or manual force

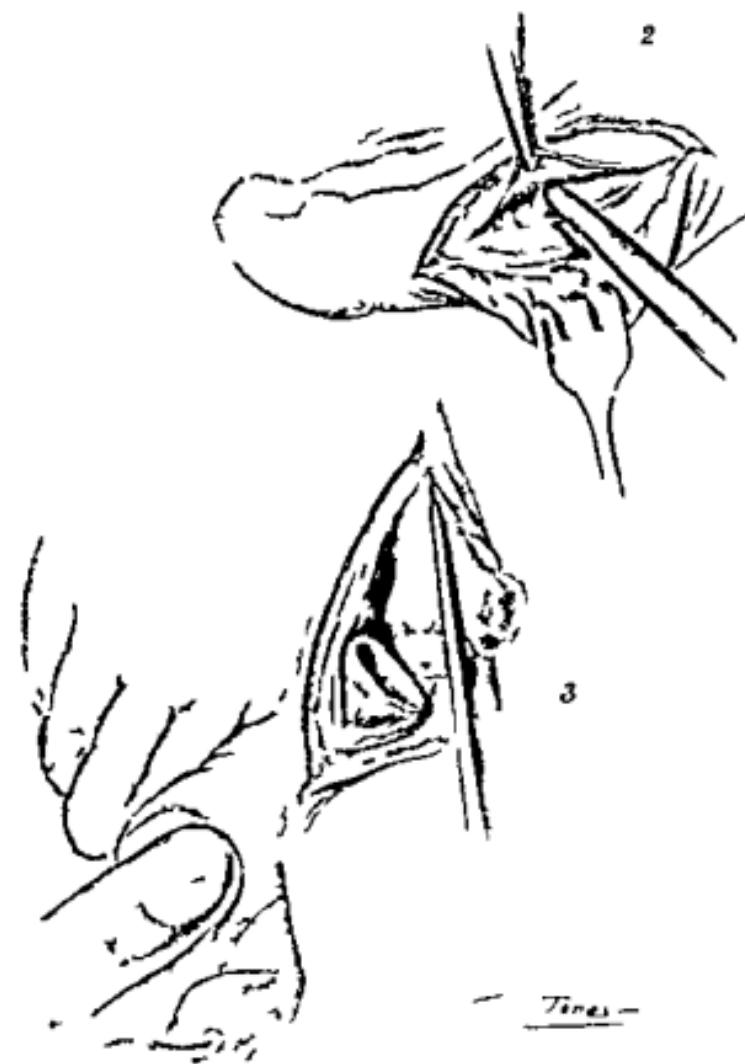
Now what can be done to give relief in a case of this kind? If conservative treatment alone were to be used it would require about two years of constant work to make the feet comfortable and at the end of this time there would still remain considerable deformity on account of the thickening of the head of the metatarsal bone and of the tissues which cover it

It will save much time to the patient and the end result will be much more satisfactory if an operation can be performed which will relieve the pain and remove the deformity Several operations have been popularized of which the most widely practised is the removal of the entire distal end of the metatarsal bone as advised by Hamilton Heubach and many others This operation has certain disadvantages It is very rarely necessary except in extreme cases where the toe is so displaced as to lie transversely across the foot It removes an important point of support from the distal end of the arch so that flat foot is certain to be caused It requires a long period of convalescence It sometimes causes ankylosis of the joint which is very disabling I very rarely feel obliged to resort to this operation Every surgeon who operates upon bunions should realize that no single method of operation will suffice for all varieties of cases and that the less mutilating operations should be used whenever the indications warrant them It is as unnecessary to excise the entire head of the metatarsal for the average painful bunion as it would be to amputate the leg for the average painful corn

A more useful operation is that described by C H Mayo in which the distal end of the metatarsal head is removed on a slant so as to allow the phalanx to come easily into the straight line The projecting inner side of the head is also removed by a longitudinal cut and the bursa is sutured over the end of the metatarsal to prevent ankylosis This operation has been widely practised and seems to have given satisfaction to most observers when



1



2



3

- Tires -

properly performed. It is unnecessarily severe in cases of moderate bunion and the results are not always good as regards the mobility of the toe. I have examined a number of patients who had been operated upon by the Mayo technic. In some of them the joint was painful and of limited motion. The articular end of the metatarsal had been cut in the usual slightly oblique manner which had left a flattened joint surface and there was a distinct lack of smoothness in the flexion and extension of the toe amounting to a perceptible jerk as the phalanx was moved over the end of the metatarsal. If you will examine this articulation in a normal specimen you cannot fail to be struck with the extremely workmanlike smoothness and roundness of the end of the metatarsal. It has to be smooth and mathematically round in order to allow the phalanx to glide over it easily. If now we cut a good sized section flat off from this round head we must not be surprised if the joint does not functionate in a normal manner. In the few cases a year where I perform the Mayo operation I carefully round off the end of the bone with an ordinary rasp in order to avoid the irregular mobility. Mechanically as well as technically it is easier and better to excise the base of the first phalanx of the toe than to interfere with the articular surface of the metatarsal head.

Another objection to the Mayo operation is that too little attention is paid to the part of the bone which is really the cause of all of the pain. It is not the articular surface which gives the trouble but the inner side of the metatarsal head. This is what projects inward and becomes pressed upon by the shoe. If we remove a long thick section from this part of the bone we at once remove the chief deformity and the exciting cause of the discomfort. We do not entirely repair the intrinsic hallux valgus the outward deviation of the big toe and the inward deviation of the metatarsal but we relieve the patient of the pain and disability. The chief value of the Mayo operation then is that it removes the bursa straightens the toe and shortens the

Fig. 192—1 Skin incision. 2 Elevating the periosteum. The bursa has been excised completely. 3 Removal of the portion of the bone which is causing the trouble.

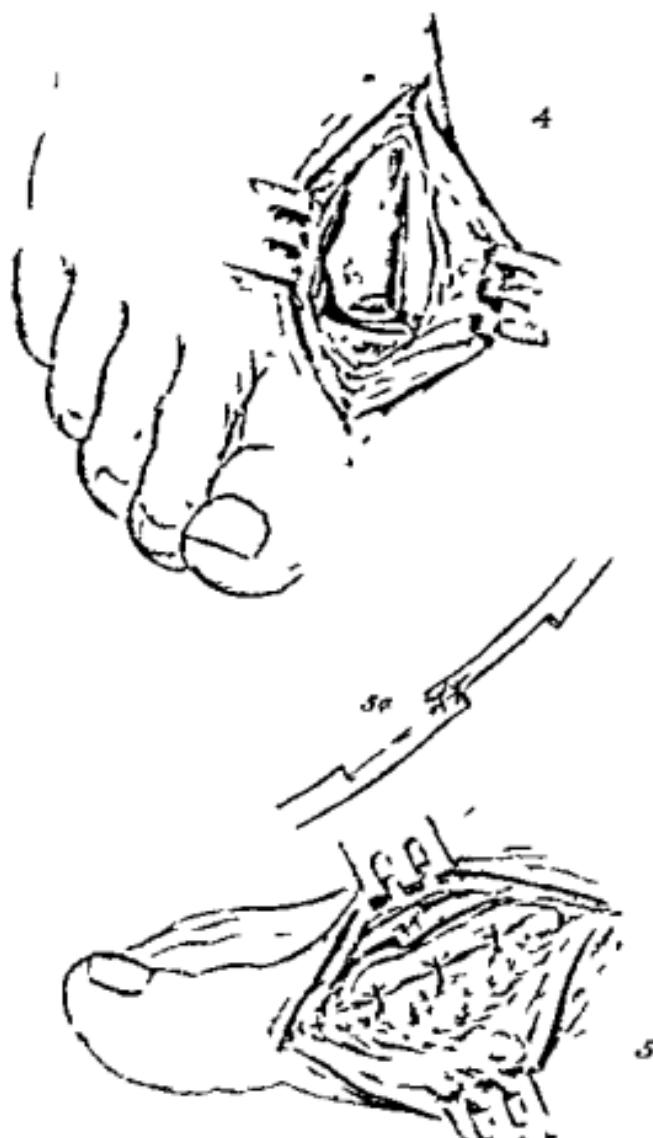


Fig. 193—4 The sharp edges of the bone have been smoothed off with a coarse file. The joint is ready for closure 5 a Method of lengthening the extensor proprius hallucis tendon. 5 Tendon lengthened Periosteum sutured loosely

toe Now, the bursa is by no means always present in even very severe and painful cases of hallux valgus When it is present it can easily be removed *in toto* The straightening of the toe is not always desirable since, first a moderate deviation of the toe is not of very great consequence provided the shoe be long enough, second it is very difficult in many parts of our country for women (and often men) to obtain shoes which will

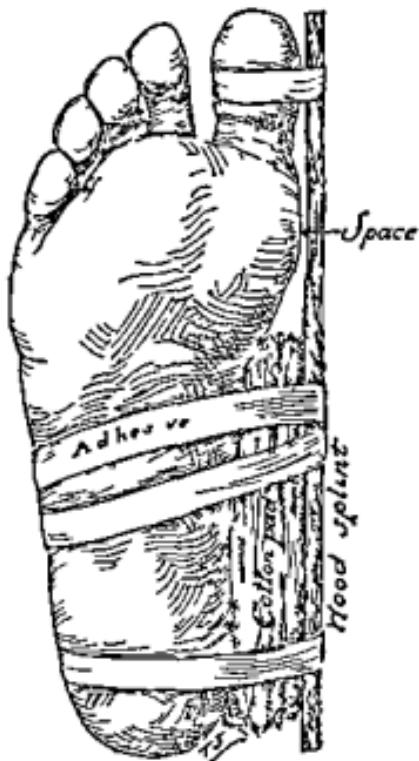


Fig 194.—Method of holding toe in corrected position Note space between toe and splint. Splint must not press against skin

allow the toe to remain straight and third it is impossible to persuade the average woman to wear a straight shoe when it can be obtained What most women desire is to be enabled to wear comfortably a shoe resembling other women's shoes The shortening of the big toe is entirely unnecessary in most instances but if it be judged necessary in individual cases it can be done much more logically by shortening the phalanx than by shortening the metatarsal bone

It will be seen, then, that I do not believe that any single type of operation is suitable for all cases of bunion, that I think many cases are subjected to unnecessarily severe and mutilating operations without sufficient indication, and that I think the operation about to be described is suitable for the large majority of cases of bunion. These beliefs are founded upon the observation of a large number of cases upon which I have operated, and a small number of cases which I have examined and treated after they had been operated upon by other surgeons. It is fair to state also that many of the patients upon whom I have operated are residents of Chicago, and can undoubtedly be produced in evidence of the truth of my statements.

The operation which I have found most frequently indicated is in no way original except perhaps in trivial details. It is essentially that described by Schede, and redescribed by Reichel, Wilson, Porter, and others. It does no damage to the joint or the arch, and it enables the patient to wear reasonably fashionable shoes without pain after a speedy convalescence.

A curved incision with the convexity upward is made from the middle of the proximal phalanx backward along the side of the metatarsal bone. It should be about $2\frac{1}{2}$ inches long. The skin flap is turned downward and if a bursa be present it is dissected out and thrown away. A longitudinal cut is made in the fascia and periosteum, and the periosteum peeled back from the metatarsal bone so that the inner half of the head and part of the shaft are exposed. The capsule of the joint is cut and the toe pushed outward so that the articular surface is clearly seen. A sharp, broad, thin osteotome is now placed at the middle of the joint surface, pointing backward toward the heel and the whole inner side of the head with part of the shaft is split off obliquely toward the base of the metatarsal. The section removed will ordinarily measure an inch or more in length by $\frac{1}{4}$ to $\frac{1}{2}$ inch in thickness. The cut surface of the bone is carefully smoothed off and rounded with the chisel and flat file and all chips and splinters are removed. In this particular case there is also an exostosis on the upper surface of the metatarsal head which is cut off with the chisel.

The toe can now be straightened, but the tendons of the extensor proprius and extensor brevis hallucis are resisting rather strongly. The brevis is, therefore, cut in two and the proprius is lengthened by splitting and suturing.

The periosteum is now brought over the denuded bone and sutured with catgut. The skin is united with waxed silk and the line of incision smeared with sterile vaselin to allow the bleeding from the bone to find an easy exit. In some cases where the bleeding is unusually free a catgut drain is inserted, to be removed in twenty four hours. A dry sterile dressing is applied.

The same operation is done upon the other foot, except that a deep callus overlying the bunion is excised. A small pad of gauze is placed between the toes to hold the big toe reasonably straight. If it were desired to make the toe perfectly straight a light wooden splint would be applied over a thick pad of cotton fastened to the posterior half of the foot, and the toe fastened to it with a strip of adhesive plaster.

In ten days the sutures are removed if the wound is strongly healed, and in a day or two more the patient is allowed to walk about on the heels, wearing bedroom slippers.

It is admitted that this operation may not, in very severe cases, sufficiently correct the deviation of the toes, but it is surprising to see how few cases will need to have any of the articular surface removed if the surgeon will first perform the operation I have described. Then if articular surface must be removed, remove it from the phalanx and not the metatarsal head.

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TREATMENT OF POTENTIAL AND ACQUIRED STATIC FLAT FOOT

Summary The four fundamental types of flat foot their clinical and anatomic characteristics potential and acquired static flat foot etiology—the importance of ill fitting shoes signs and symptoms as related to the advancing pathology in progressive cases differential diagnosis treatment—prophylactic and curative—the strapping method

IN order to secure the desired end result in the treatment of flat foot in the largest possible percentage of cases there are certain fundamental principles which should be thoroughly comprehended and kept constantly in mind by the physician applying the treatment The first one of these is the fact that there are four fundamentally different types of flat foot and because of the fact that the method of treatment which is very beneficial for one type may be valueless in the other it is of great importance to make an accurate differential diagnosis before a line of treatment is decided upon and instituted The four types of flat foot are congenital traumatic paralytic and static and the latter is again subdivided into potential and acquired

Congenital flat foot is very often not a true flat foot at all as the arch of the bony structure of the foot may be perfectly normal and the space under the arch of the foot simply filled in by a cushion of fat This type of flat foot very often causes no symptoms and in that event does not incapacitate the patient The fact that the patient has always had a flat foot can usually be ascertained from the history and helps in making a differential diagnosis If the history is indefinite a stereoptican x ray is of great help There is never any spasticity of the muscles in a simple congenital flat foot The foot has a peculiar pudgy appearance as a rule

Traumatic flat foot, as the term implies always follows a traumatism, evidence of which is usually found on inspection or can be elicited in the case history. Every case of traumatic flat foot is a problem in itself, and no routine treatment can be outlined because the location, nature, and extent of the injury and deformity must determine the treatment to be followed.

Paralytic flat foot often follows infantile paralysis and its diagnosis is usually the diagnosis of infantile paralysis.

Flat foot is much more common than is generally supposed. In Munson's work we find the statement that of 9901 members of the Illinois Guard, who offered themselves for the United States service in 1898, 33 or $3\frac{1}{2}$ per thousand, were rejected because of excessive or painful flat foot. All of these had previously passed the physical examination required to enter the State Militia. How many were rejected during this first examination is not stated, nor is there any record of how many of the remaining 9868 suffered to a minor degree from this condition. From the Surgeon General's Office I was able to obtain the following statistics. During the years 1903, 1904 and 1905 132,145 men were examined for the United States army. Of this number, 457, or $3\frac{1}{2}$ per thousand, were rejected because of excessive flat foot. These figures include all men who were examined for re-enlistment and does not take account of those suffering from flat foot who were rejected for some major trouble. For instance an applicant suffering from hernia and flat foot was of course, rejected, but the cause of his rejection was given as hernia. From these statistics one would be justified in concluding that out of every 10,000 men at least 33 are suffering from flat foot to a degree which makes them undesirable for military service. I am in

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to settle this question more definitely because a very much larger number of men will have been carefully examined by that time and those examined will more nearly represent the average citizen than in any previous examination.

The balance of this discussion will be devoted to a con-

sideration of the two forms of static flat foot potential and acquired

Etiology—Whenever a disproportion occurs between the strength of the foot and the strain to which it is exposed flat foot is likely to develop in other words anything which weakens the foot or exposes it to excessive strain predisposes to the production of this condition. The strength of the foot may have been impaired from birth may have become impaired through systemic disease or what is much more likely may have become relatively weak at the time of puberty. The careful study of the histories of many flat foot patients reveals the fact that the great majority of them refer the first occurrence of flat foot pains back to this period in life. The disproportion which exists at this time between the weight of the body and the strength of the muscles is unquestionably one of the most common causes of flat foot but anything which weakens the general musculature such as severe systemic disease or which in any way impairs the strength of the tibialis anticus and posticus muscles in particular has the same tendency. The excessive strain may be caused by anything which increases the weight of the body or the load that is to be born by the arch thus for instance obesity with the lack of sufficient exercise to keep the musculature in good tone is not an uncommon cause of flat foot excessive burden bearing particularly during the period of adolescence is also a common cause, long continued standing when tired particularly when the patient has gotten into the habit of assuming the attitude of rest so well described by Annandale is very prone to cause flat foot because this attitude places the supporting muscles at a great mechanical disadvantage and thus increases the strain to which the ligaments are exposed.

Ill fitting shoes are another common cause of flat foot. Many of the ready to-wear shoes are too low over the instep and as a result many a person who starts out in life with splendid arches develops flat foot in the course of years because his shoes are constantly exerting pressure over the arches forcing the foot into abduction and eversion thus putting them at a mechanical disadvantage. This is much more readily understood if we recall

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Flat foot is much more common than is generally supposed. In Munson's work we find the statement that of 9901 members of the Illinois Guard, who offered themselves for the United States service in 1898, 33, or $3\frac{1}{8}$ per thousand, were rejected because of excessive or painful flat foot. All of these had previously passed the physical examination required to enter the State Militia. How many were rejected during this first examination is not stated, nor is there any record of how many of the remaining 9868 suffered to a minor degree from this condition. From the Surgeon General's Office I was able to obtain the following statistics. During the years 1903, 1904 and 1905 132,145 men were examined for the United States army. Of this number, 457 or $3\frac{1}{8}$ per thousand, were rejected because of excessive flat foot. These figures include all men who were examined for re-enlistment and does not take account of those suffering from flat foot who were rejected for some major trouble. For instance an applicant suffering from hernia and flat foot was of course, rejected, but the cause of his rejection was given as hernia. From these

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clined however, to believe that these figures are somewhat too low, because, as a rule only reasonably able-bodied men apply for enlistment. When the present war is over we may be able to settle this question more definitely because a very much larger number of men will have been carefully examined by that time and those examined will more nearly represent the average citizen than in any previous examination.

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incapacity, the latter varying in degree from a slight temporary functional impairment to complete, more or less permanent, disability. The first change that usually occurs in the development of static flat foot is relative general muscular weakness, accompanied by more pronounced weakness of special muscles, especially the tibialis anticus, tibialis posticus, and short plantar muscles. This throws excessive strain on the fascia and ligaments which is followed by their stretching, causing a rotation of the bones with a change of their axis and weight bearing surfaces, which must sooner or later result in a change of their shape. If now the opposing muscles in their attempt to immobilize the painful member, become hypertrophied, rigid, and spastic, we have the most troublesome condition so-called rigid flat foot. If, however, this hypertrophy of the muscles does not occur and the causative factors are not removed, we will get the complete breaking down of the arch, robbing the foot of all of its elasticity. This sequence is by no means universal but certainly very common and I have frequently seen all of these stages and have been able to follow one stage after the other in the history of some of these cases.

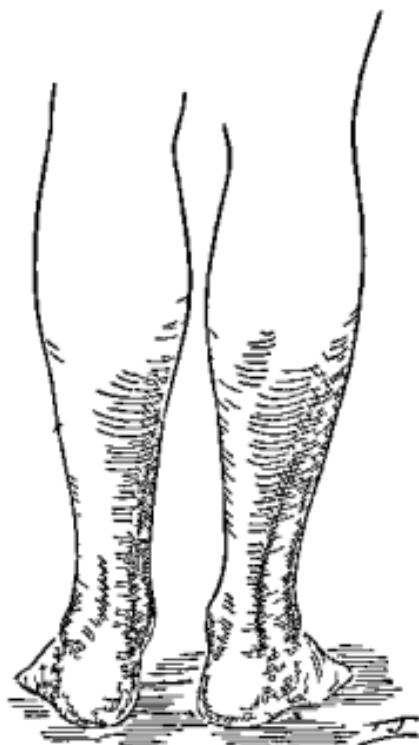


Fig. 196.—The left leg illustrates the outward deflection of the tendo achillis characteristic of flat foot right leg normal

The one never failing sign of flat foot is the outward deflection of the lower end of the tendo achillis as illustrated on the left leg in Fig. 196. This sign was first described by Helbing and, so far as my experience goes, it is always present even in the early potential cases, in fact, it is a much more reliable and

the rule in physics which states that action and reaction are always equal and in opposite direction and also if we study Fig 195 carefully, which is the actual outline of a foot and the actual outline of the corresponding shoe which had been worn on this foot for a considerable time. This illustrates clearly that, when this shoe is placed on the foot pressure has a tendency to eventually break down the arch and to force the foot into eversion (Fig. 196). One proof of this latter effect is found in the fact that many patients who have unusually high insteps have corns on the outer surface of their little toes because these surfaces of



Fig. 195.—Solid line shows outline of shoe; dotted line outline of foot; arrow shows point of excess ve pressure if shoe is too low at the instep.

the feet are constantly being pressed against the inner surface of the shoes. As long as the faulty shoe is worn nothing will permanently relieve the corns but as soon as a suitable shoe is substituted the corns can easily be cured. A further proof of the harmful effect of a shoe that is too low over the instep is the fact that potential flat foot pains are if anything more common among persons who start out in life with a high instep than among those who start with a low one.

Signs and Symptoms—Though never fatal it causes much discomfort frequently considerable pain and often not a little

Occasionally flat foot causes pain in the hip and the small of the back Other common symptoms of flat foot are numbness coldness clamminess and cyanosis of the extremities

In the successful treatment of flat foot it is very interesting to observe how one after the other of these symptoms will disappear One of the first to appear and also to disappear after the proper treatment has been instituted is the excessive sweating of the feet from which these patients complain The following history is typical of the ordinary beginning potential flat foot

Male seventeen years of age moderately slender 6 feet tall weight 154 pounds made biggest growth in last two years had no children's diseases except diphtheria at two years of age About three or four years ago began to have trouble with feet and ankle joints Later went to Florida and worked on a farm During this time feet troubled him greater part of the time Complained of pain in arches of both feet At present complains of pains when he walks and a feeling as though foot was falling flat and there is considerable numbness of limbs when walking Cannot engage in any out-of-door sports The calf muscles not very well developed considering height and weight of patient No muscle spasm but on standing arches drop down considerably Marked prominence of scaphoid with considerable pain and tenderness over calcaneoscapheoid ligament and very pronounced outward deflection of both tendo achilles (In Fig 196 the sketch on the left is an accurate reproduction of the condition found in the left leg of this patient the sketch on the right represents the normal by contrast) Feet perspiring considerably cold and clammy Patient first seen and treated as hereafter described on November 14 1917 then again on December 7 1917 when the cyanosis had entirely disappeared Examined again January 11 1918 when all symptoms had entirely disappeared—no pain numbness or sweating

As stated above this was a beginning potential flat foot which while it had not resulted in any serious incapacity had been very annoying and if left untreated would probably soon have developed into the spastic form of potential flat foot which is much more painful and causes much greater incapacity and the prin

characteristic sign than is the breaking of the arch itself and appears much earlier in the disease.

Another sign is the peculiar gait of the patient. This differs somewhat in the different types of static flat foot. In the potential variety the patient steps rather gingerly, as though walking on peas, while in the acquired flat foot there is a marked abduction and eversion, with the knee slightly flexed and the back bent and the foot hitting the ground rather hard.

The tendency to fatigue, weakness, and discomfort, even on the slightest exertion is also often very marked. The patient is disinclined to arise when in a sitting position and lacks alertness. He sits down, or assumes the "attitude of rest" whenever possible, often complaining of cramps in the calf and spasm of the foot which throws the foot into a position of abduction and eversion. In the severe cases the discomfort may change to severe pain, and as the disease progresses a number of characteristic points of pain are likely to develop. The first and most common is at the inner portion of the foot, where the tuberosity of the scaphoid and the head of the astragalus make pressure on the calcaneoscaphoid ligament. Sometimes the irritation becomes so severe here that a bursa develops, which may become inflamed and the pain may become so excruciating as to make all locomotion impossible. Another common point of pain is on the dorsum of the foot, where the scaphoid impinges on the neck of the astragalus. A third point of pain is just in front of the external malleolus where a point of friction occurs between the external malleolus and the astragalus, due to the changed relation of these bones. Another point of pain is over the plantar surface of the heel. This pain has on a number of occasions been falsely diagnosed as a true inflammatory periostitis. While an inflammatory periostitis does appear here occasionally a traumatic flat foot periosteal irritation is undoubtedly the much more frequent cause of pain in this location. I have seen quite a number of these patients operated upon without relief who subsequently secured complete relief when their flat foot was properly treated. Another common point of pain is found in the ball of the foot at the metatarsal phalangeal junction so often described as Morton's toe.

tion of weight and strain and disuse of normal function is of vastly greater importance than the depression of the arch, which has given the name to the disability."

Treatment.—The treatment may be divided into prophylactic and active. Great care should be taken that young persons during puberty and adolescence be not exposed to excessive strain. This same precaution should be observed following an acute illness or when a person is, for any reason, greatly below par. Again persons who have a tendency to obesity, particularly if they have relatively weak muscles, should have their muscles strengthened by proper physical exercises and their weight reduced by suitable diet. Excessive burden bearing, particularly during the period of adolescence, should be avoided. Persons whose trade or vocation requires them to stand for long periods of time should be taught to stand with their feet close together and parallel and should be cautioned never to assume the "attitude of rest" or to stand with their toes out. Toeing out, both in standing and walking favors the production of flat foot and should constantly be discouraged. It lowers endurance and does not favor gracefulness, as is so commonly supposed. Another important prophylactic measure is suitable shoes. The shoe manufacturer should never forget that space has three dimensions, and that all of the three dimensions must be taken into consideration in the manufacture of satisfactory shoes. Length and width are usually considered but height particularly over the instep is rarely thought of, with the result shown in Fig 195 and considered under Etiology.



Fig 197.—General outline of the best type of shoe a straight last and widest where the ball of the foot that is, the metatarsal phalangeal junction should rest

cipal symptoms of which are muscular rigidity, eversion and abduction, and inability to bring the foot into its normal adducted inverted position either voluntarily or by passive motion. In some of these cases the muscular rigidity becomes so pronounced that even a general anesthetic will not completely relax the abductor muscles. This type of rigid spastic potential flat foot is often met with even before the arch begins to break, is often extremely painful, and may cause a high degree of incapacity, as the following case history will illustrate.

Some years ago a merchant thirty three years of age 5 feet 10 $\frac{1}{2}$ inches tall, weight 190 pounds came to see me with a history that two years previously he had been having trouble with his feet, suffering much discomfort and considerable pain, which occasionally made walking almost impossible. He hobbled along with two canes wore steel flat foot insoles attached to braces extending within a few inches of his knees without relief. The arches showed no tendency toward flatness, but there was marked abduction and excessive rigidity of the abductor muscles making it impossible to bring the feet into normal position. After eight months of treatment the patient made a complete recovery.

If such a case as this is not relieved, it will ultimately progress to complete static flat foot, with a complete breaking of the arch. In this condition the pain is often less severe than it is in the potential flat foot, but the patient acquires a displeasing shuffling gait and his endurance is usually very greatly reduced.

Well made imprints of the sole of the foot are often of value in making a differential diagnosis between potential and acquired static flat foot and of interest in watching the progress of the condition but we must not forget that there is no direct relation between the sinking in of the arch and the severity of the symptoms or the degree of the disability. A potential flat foot may be so painful as to incapacitate the patient from all work and yet show no loss of arch. While on the other hand a fully developed static flat foot may cause relatively little pain, though it always impairs the usefulness of the foot more or less. We must ever remember that 'flat foot is a compound deformity in which the abnormal relation in foot and leg causing the improper distribu-

can be taken either in the lying sitting or standing position and should be done ten times with each foot two or three times each day. It is probably the most important exercise because the purpose is to strengthen the tibialis anticus and posticus muscles—the two muscles which bear the closest relation to flat foot. If these two are unusually weak flat foot is almost sure to develop while if they are in normal health and strength flat foot is not likely to develop.

A good general massage is of very great value in building up the general muscular system and also in insuring proper development of these special muscles but massage should be given by a person well trained in the art otherwise it may either prove valueless or actually do harm.

In this connection it is necessary to say a word about flat foot insoles. While flat foot insoles give temporary relief in some cases my experience with them leads me to the conclusion that they never cure a case of flat foot and that they actually make many cases worse. They are wrong in principle because instead of strengthening the tibialis anticus and posticus muscles they actually weaken them instead of adducting and inverting the foot they actually force the foot into abduction and eversion and instead of relieving pressure at the points of pain they often actually increase pressure at these points. I have seen some cases of flat foot that were temporarily relieved by flat foot insoles only to become much worse later and I have seen a number made worse from the very beginning. Some years ago I treated a patient for flat foot who had in his possession over thirty pairs of flat foot insoles some of them procured ready made from the shoe store some of them made by orthopedic instrument makers and a great many of them made at the direction of some of our most eminent orthopedic surgeons. In spite of all of these appliances it was almost impossible for him to walk. After discarding all of the flat foot insoles and following the treatment above outlined and the strapping which I am now to describe he was completely relieved in the course of about six months—not only was he relieved of all of his symptoms but a fairly good arch was again re-established.

The inner border of the shoe should be a straight line as shown in Fig 197. If the shoe points at all, it should point only from the outer side. The tip of the great toe should never be crowded outward. If these two precautions are not observed the foot is sure to be forced into abduction and eversion sooner or later and a more or less pronounced flat foot is bound to develop. The metatarsal phalangeal joint should come at the widest point of the shoe as also illustrated in Fig 197. This is important in order that elasticity and springiness of the arch of the foot be not impaired and that the shoe may be comfortably fitted to the foot.

Persons with unusually high insteps or unusually long arches in proportion to the other dimensions of the foot should always have shoes made over a special last. This can easily be secured by first making a plaster-of-Paris cast of the foot and then having the last maker make a last according to the dimensions of the cast. Having shoes made in this way prevents the necessity of breaking in shoes is of great protection to the foot and a decided saving in the cost of shoes because if the shoe does not fit, not only will the foot be broken in but the shoe as well as a consequence of which it wears out sooner than it would if properly fitted to the foot. A properly fitted shoe should be as comfortable the first day it is worn as the day it is discarded.

Strengthening the general muscular system of the body by proper hygienic measures and suitable exercise are two of the most important therapeutic remedies to be employed in the relief of this condition. For a number of years I directed my flat foot patients to procure and use Schreberer's little book on physical exercise. Almost since the very beginning of the war I have been unable to secure this book and as I could not find a suitable substitute felt compelled to publish a book on *Physical Exercises for Invalids and Convalescents* which I find very useful in this and allied conditions. In addition to the exercises contained in this book I teach the patient one special exercise which consists in a rotation of the foot first inward then upward then outward and then downward to the first position with special emphasis on the inward and upward parts of the exercise. This exercise

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Strapping.—The special method of strapping which I have used in all of my cases of potential and acquired static flat foot

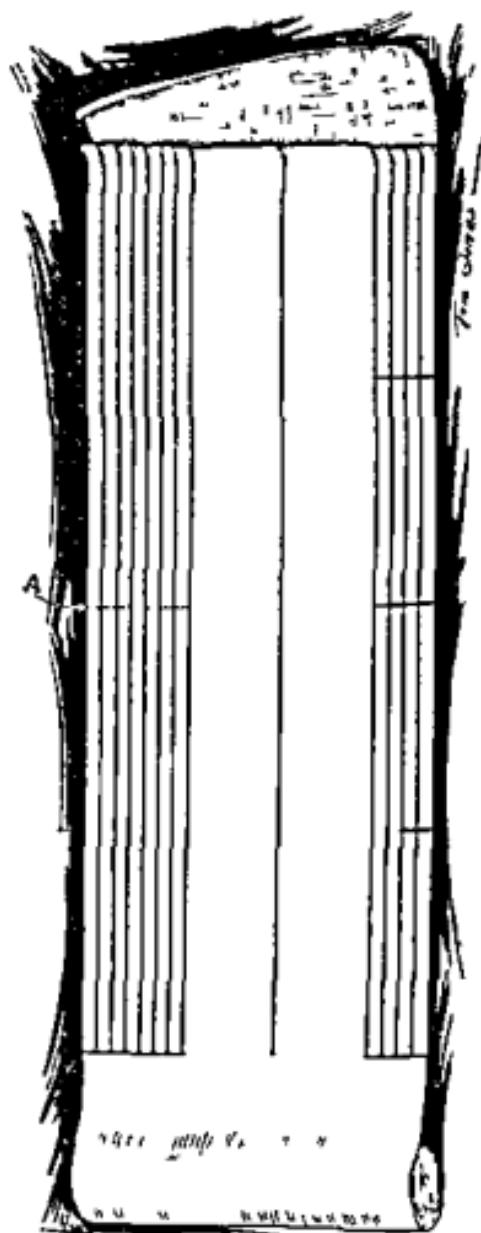


Fig. 198.—Manner in which the zinc oxide plaster is marked off preparatory to the cutting of the strips.

during the past twenty years is supplementary to the general treatment above outlined. I go into the minutest detail in the

description of this method because upon the accuracy with which it is applied depends very largely the results obtained.

First, I select the best grade of zinc ovid adhesive plaster that I am able to procure. I always use this in the 12-inch rolls



Fig. 199.—Showing how hospital patient holds foot preparatory to strapping, the heel rests on a block which is firmly anchored to the table

because I have found this size much more convenient, much less expensive, and to adhere much better than the adhesive plaster one buys on spools in the drug stores. In handling the adhesive

plaster great care must be exercised in not unnecessarily robbing it of any of its adhesive quality before it is applied. The adhesive surface of the plaster should not be unnecessarily handled, especially with perspiring hands or by first sticking it on walls or gowns, etc. The more of the adhesive quality that it retains—



Fig. 200.—Another method of supporting the foot preparatory to strapping. The heel rests on a chair which is backed up against the wall to prevent its slipping away.

in other words, the better the adhesive sticks when once applied to the foot—the quicker the desired result will be secured.

For the purpose of strapping an adult male patient's foot of average size I mark off seven strips $\frac{1}{2}$ inch wide by 32 inches long, with a cross line at the middle, as shown by line A, Fig. 198,

fourteen strips $\frac{1}{2}$ inch wide by 8 inches long, two strips $\frac{1}{2}$ inch wide by 16 inches long, and divide the balance of the adhesive plaster in two strips each $3\frac{1}{2}$ inches wide (Fig. 198)

If the patient is a hospital patient, he is now placed on an operating table, in the position illustrated in Fig. 199, with the heel on a small block, a loop of hard roller bandage of convenient length thrown across his foot. The operating surgeon now places the foot in the proper position of adduction and inversion with



Fig. 201.—The application of the first two long strips and one outer short strip

the ankle at a little less than right angle. The patient is then directed to make tension on the hard roller bandage so as to maintain the foot in this position until the strapping is completed. By grasping the bandage a little further down with the inner hand and making greater tension with this hand the position is usually maintained without much difficulty (Fig. 199).

In high grades of spastic flat foot only partial correction of the abnormal position is possible at the first strapping but with



the foot, just anterior to the last 32-inch strip and slightly overlapping it, and brought around the inner surface of the foot and up the front of the leg, as shown at *A* in Fig 203. The second $\frac{1}{2}$ by 16 inch strip is now applied, slightly overlapping this one. Now the circumference of the leg is taken just above the thickest point of the calf, one of the $3\frac{1}{4}$ inch strips is cut an inch shorter than the circumference and applied circularly, as shown in Fig 204. The remaining circular strips are now



Fig 203.—The strapping nearly completed, all the $\frac{1}{2}$ by 32 inch, $\frac{1}{2}$ by 8 inch, and $\frac{1}{2}$ by 16 inch strips have been applied

applied, as shown in this figure, being sure not to permit the strips to overlap or even to meet posteriorly. This point is of very great importance, because if they do overlap the circulation of the leg and foot are interfered with and the muscles do not secure enough nutrition to properly develop and regenerate.

The straps, applied as directed in the preceding paragraph, will remain in place and be effective for from four to eight weeks, depending upon the kind of work the individual does, upon the quality of the adhesive plaster, and upon whether the patient

perspires greatly or not. When the straps begin to get loose, they are removed, preferably in the evening, the foot washed with soap and warm water, and restrapped the next morning until the patient is relieved of his trouble. From one to ten strappings will not only relieve but cure practically every case of static flat foot.

Prognosis—Contrary to the generally accepted opinion even among medical men, the prognosis in static flat foot of both varieties is very good, provided the above line of treatment is

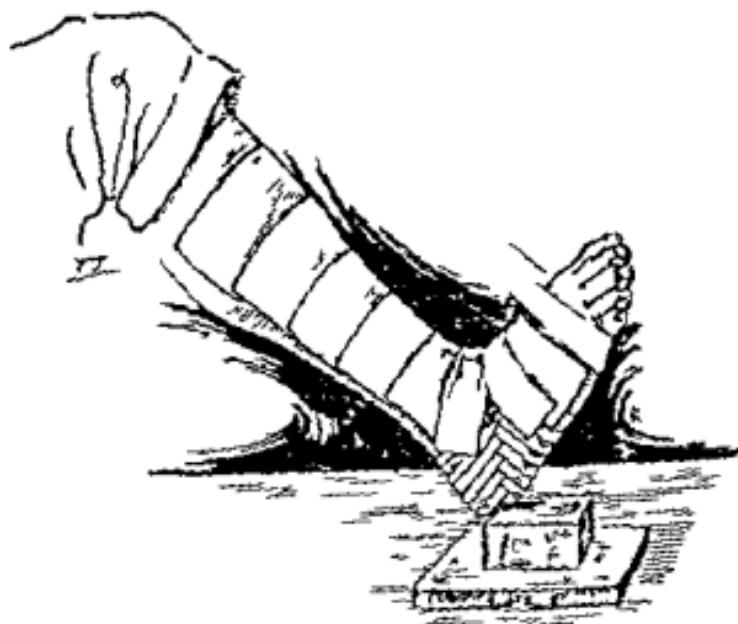


Fig 204.—The strapping completed: the three $\frac{1}{2}$ inch strips have been put on to hold down the other strips. Note that they do not overlap posteriorly.

carefully followed both by the attending surgeon and the patient. I have now followed the above line of treatment for over twenty years, and every patient suffering from this condition that has persisted in the treatment has been relieved of his symptoms, and a very large percentage of them have actually been anatomically cured. While I realize that the last statement may seem incredible to some yet flat foot reprints taken before treatment has been instituted and again when a symptomatic cure has been secured proves its correctness incontrovertibly.

The chief objects of the treatment above outlined are to overcome any disproportion which may exist between the strength of the arch and the weight to be borne, and to place the arch at its greatest possible mechanical advantage, namely, the center of the arch directly under its burden. If these two main objects are accomplished by the treatment, the minor objects necessarily fall into line, and, as a natural consequence, the symptoms disappear and a cure results.

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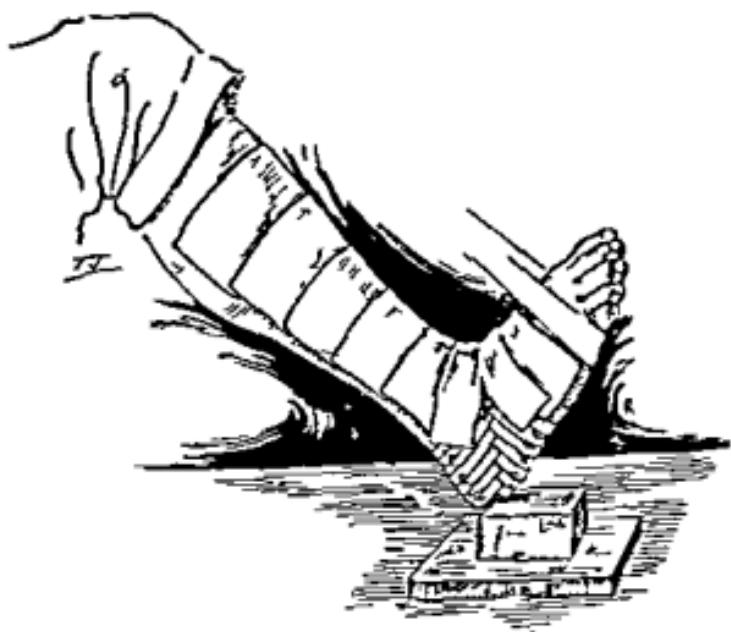


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CLINIC OF DR COLEMAN G BUFORD

CHILDREN'S MEMORIAL HOSPITAL

UMBILICAL HERNIA OF INFANTS AND CHILDREN

Summary Etiology—importance of digestive disturbance and neglect—the two types—characteristics of each, prophylaxis and non-operative treatment—the Coley hemispheric wooden buttons and the adhesive plaster girdle—their proper application—general management: indications for operation—technic, after treatment

UMBILICAL hernia in young children is not a new subject, but because of the large number of children appearing at the Surgical Clinic of the Children's Memorial Hospital exhibiting this defect naturally the subject has become a very important one with us. Were it not true that there are so many vague and improper impressions abroad concerning this affection I would not think of elaborating upon it. The proportion is so much larger in dispensary than in private practice that I am led to the belief that prenatal and postnatal malnourishment is a very important etiologic factor, and that these children are more subject to digestive disturbances and neglect, and, consequently, cry more thus inviting hernial protrusions. Excessive coughing, as in bronchitis and whooping cough, increasing intra abdominal pressure, reopens rings which have been previously closed.

There are two distinct types of umbilical hernia those protruding through apertures beside the obliterated cords and those protruding through openings in the abdominal fascia just above the umbilicus.

The apertures of those which lie beside the cord are due to failure of the fibrous structures surrounding the cord to close by contraction or if once closed, they reopen on account of undue intra abdominal pressure or a weak ring, or both. The rings

which become a source of evil through limiting peristalsis and inviting intestinal stasis and resultant digestive disturbances with all that goes in their wake.

Non-operative Treatment—The usual routine of non-operative treatment consists of the use of cotton wads, buttons, coins and metal plates held on the navel by short strips of adhesive plaster. These cannot resist the protrusion since the



Fig. 205.—Large umbilical hernia. Aperture is an abdominal fascia; this is not a true umbilical hernia.

plaster has no fixed point. Invagination of the navel through drawing the skin together on either side by adhesive has many advocates. I have never seen any benefit from it. Manufactured and home made removable belts and trusses both containing pads for retaining the hernia are in common use. Occasionally benefit is derived from these but on the whole a removable appliance is dislodged frequently used irregularly and seldom worn at night consequently the frequent protrusions

are small, rarely larger than a pea, elongated, the long axis usually lying horizontally, and are frequently angulated. The free margins of the rings are firm, thick, elevated, and rounded. The contents of the sacs are usually omentum but occasionally a knuckle of gut fills the sac. Both types are usually reducible. The protrusion rarely exceeds the size of one or two peas and occasionally one sees the umbilicus pushed forward and downward, the protruding mass assuming the shape of a nipple or an infant's penis.

In the second group are those which protrude through apertures in the abdominal fascia just above the umbilicus their lower margin reaching to the upper border of the contracted ring previously described, but the rings of these never open into one another, neither have I seen the two types present in the same patient. These are not true umbilical hernias, but are diastases in the linea alba, of which there may be others above. These rings are relatively large, often reaching $1\frac{1}{4}$ inches in diameter or larger. Their margins are very thin and pliable. The protrusion is rotund and the contents usually reducible (Fig. 205).

Treatment.—*Prophylaxis*.—In view of my finding during operations so many long and very narrow peritoneal protrusions so very closely blended with the umbilicus I am convinced that most of the first type are congenital hernia which remain open or, if closed, are destined to reopen in early infancy. The peritoneal protrusions have been engaged in the rings and serve as points of easy egress for knuckles of omentum or intestine, therefore prophylaxis is of little benefit in these, usually only delaying the appearance of a hernia.

In the second type there is little doubt that lessened crying and coughing through good care and feeding and gentle support of the abdomen, by use of a binder, are beneficial prophylactic measures. If these weak areas are not opened up in early life there is a good chance of them becoming thicker and stronger as the child matures. Whatever good may be said of the abdominal binders, used so commonly in early infancy as an abdominal supporter, they are too frequently applied tightly and I

four weeks and should always be changed when they begin to loosen. Upon removal all resin from the adhesive plaster should be removed from the skin with benzine which is carefully cleared away with alcohol followed by water sponging. If the residue of the evaporated benzine is left on the skin and covered a blister may follow. The only serious drawback to this dressing is the skin irritation induced. Rapid tub bathing is permissible. From a theoretic standpoint such a fixed dressing worn day and night for several months seems most satisfactory for if properly cared for the hernia rarely protrudes. From a practical standpoint it is also the best dressing available but does not accomplish as many cures as is supposed. In the small slit like openings the true umbilical hernia among which we might expect the highest percentage of cures I rarely have cures during the months of early life when parents are most willing to bring their children for regular care but I have now had sufficient opportunity to observe these in later life to have been impressed with the belief that the majority of this type undergo spontaneous cure before the pubescent period and that the closure of the rings usually occur in well-developed children after they have taken on active outdoor sports. My failure to cure many of these true umbilical herniae by non operative means has caused me to refrain from urging continuance of treatment if after six to nine months of constant wearing of the appliance there has been no marked improvement. The frequency of spontaneous cure after the seventh or eighth year and the rarity of strangulation among these prompts me to defer operation in all but the definitely hopeless type which are those



Fig. 207.—With a plaster and button applied.

overcome whatever contraction has taken place in the ring while the pad was worn. I was impressed with the uncertainty of all of these methods many years ago and in casting about for a method which would keep the button in place and give a fixed point for counterpressure I adopted with some modifications a method described by Coley many years ago consisting of hemispheric wooden button molds (Fig. 206). These should be $\frac{3}{4}$ inch in diameter or larger. They are covered on the convex surface by Z. O. adhesive plaster carefully stretched over it and ironed down to perfect smoothness with the finger nail and evenly trimmed around the base. Its flat surface is placed

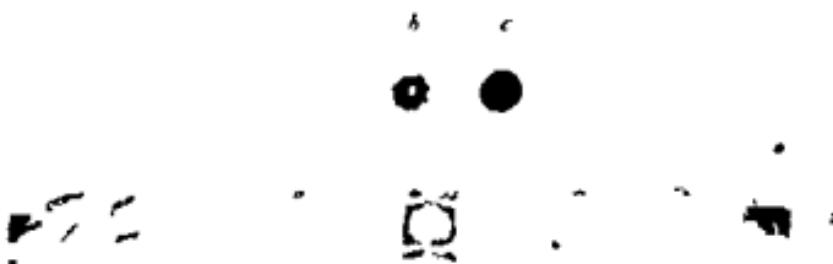


Fig. 206.—*a*, Zinc oxide adhesive plaster partly lined by gauze to prevent adhesion of plaster to skin. *B*, Button mold. *c*, Button mold covered with adhesive plaster ironed down to perfect smoothness on convex surface.

upon the middle of a strip of Z. O. adhesive $1\frac{1}{2}$ to $2\frac{1}{2}$ inches wide according to the size of the child and long enough to more than encircle the body. The plaster is partly lined with gauze or sheet wadding to preserve part of the skin from the irritating effects of the plaster which area will be used to apply plaster at the next dressing. The plaster is applied with such obliquity following the bodily contour that its upper and lower edges exert equal tension (Fig. 207). When the edges cause abrasions they should be turned in or lined with sheet wadding. No dusting powder should ever be applied because it becomes moist with perspiration and macerates the skin. These dressings if well cared for last from ten days to

mattress sutures usually two never more than three. The free edge of the lower margin is then pulled upward spread out and fixed in place by one or two sutures thus giving broad approximation of surfaces. If there is sufficient subcutaneous tissue it is brought together with fine iodin catgut. The skin is

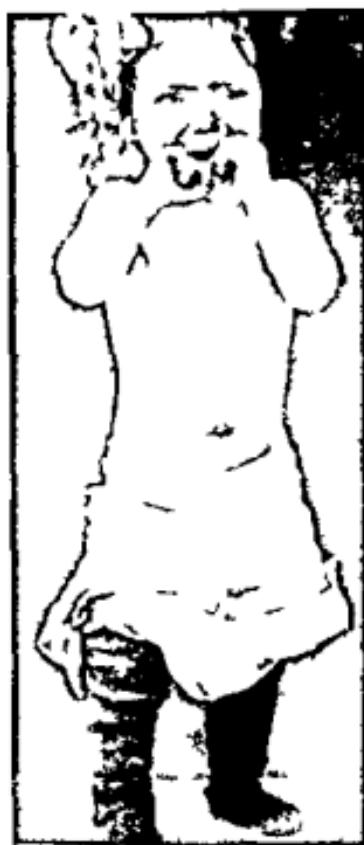


Fig. 208.—Small scar above navel resulting from operation for umbilical hernia. Navel preserved. The semilunar incision becomes almost straight when closed by subcuticular suture.

closed by a subcutaneous silkworm gut suture which is tied over a very small thin strip of gauze. No drainage is used. The abdomen is encircled with adhesive plaster and the child put to bed with the following provisions. Freedom of movement in bed. If necessary may sit up in an easy position to attend to the calls of nature. Warm covering for upper part of body.

with the very thick rounded edges lax rings, and those with long peritoneal protrusions.

As paradoxical as it may seem, by use of the button and adhesive belt I have had the best results in those of the second group, whose apertures are just above the navel and which are really apertures in the linea alba. A fair percentage are cured in six months to a year when treatment is begun before the child is six months of age. The cures diminish in frequency as age advances. Very few of these patients return because the ring has reopened.

Operative Treatment—All patients of any age who develop serious digestive disturbances or discomforts possibly due to the hernia and all incarcerations and strangulations are promptly operated upon. Uncomplicated umbilical herniae not likely to close are operated upon at a time of convenience but preferably well after the first year of life when surgical risk begins to lessen and the larger size of the body renders asepsis more possible at the operation and systematic after care may be more easily carried out.

I am now routinely using a very small semicircular skin incision with its convexity upward lying above and around the umbilicus. The flap of skin and subcutaneous tissue is dissected up including the umbilicus which is thus preserved. The ring is exposed as far as possible at this time the peritoneal protrusion is found partly freed and then opened. While the skin flap is lifted the peritoneum is carefully dissected off the navel. I know of no place where the peritoneum blends so tightly with another tissue as in true umbilical hermæ. The dissection is carried on with a sharp knife care being taken not to perforate the skin. When the sac is made free where it lies outside the abdomen it is then freed from the ring and well under it. At this point it usually becomes thin and may be easily broken through. If made free intact it is ligated and the sac cut off, if torn it is sutured in the direction it will most easily approximate.

The closure of the ring is accomplished by bringing the lower over the upper edge with the fewest No. 1 chromic catgut

CLINIC OF DR ROGER T VAUGHAN

COOK COUNTY HOSPITAL

INCARCERATED RIGHT SCROTAL HERNIA DUE TO ADHERENT CARCINOMATOUS OMENTUM

Summary A patient presenting an irreducible nodular swelling in the right inguinal canal and scrotum diagnosis—similarity of lesions to Perl'sucht of cattle pathologists report—carcinoma simplex metastatic in omentum

HISTORY

THE patient is twenty seven years old single a baggage porter nationality American He was admitted to the hospital January 29 1918 at 5 15 P M

The patient states that he has had a right scrotal hernia for ten years At various times he has experienced slight attacks of pain and cramps localized chiefly in the region of the hernia but he has had no previous attack so severe as the present or accompanied by vomiting or even by nausea Until last week he has always been able to reduce the hernia at will but last week he does not know on exactly which day it came down and has remained down since he is unable to reduce it Furthermore he has been unable to work on account of the pain and tenderness at the present hernial site He has however had no nausea or vomiting His bowels have moved every day and he had a bowel movement this morning He is normally inclined to be constipated and so takes oil in some form rather frequently Otherwise he has no complaints no headache no cough no dyspnea no abdominal distress otherwise than above noted He thinks he has had some of the diseases of childhood but does not know which He has never been operated on He had a Neisserian infection in 1918 but denies other venereal illness

Father mother five brothers and three sisters are living and well The patient states that he has lost 18 pounds in weight in the last six months He does not know why unless it be due to hard work recently as a baggage porter Appetite is good

gowns and shirts are rolled and fixed well above the level of the umbilicus. Stockings are worn in cold weather. No diapers or other garments are worn about the abdomen or pelvis which might become urine soaked. In males a wide flap of adhesive is applied to the pubes so as to overhang the penis as a small apron. The overhanging part is prevented from sticking to the skin by folding it under upon itself or lining it with gutta percha or gauze. This apron if kept spread out prevents the urine from an erected penis from reaching the abdomen or bed-cover. In all pediatric surgery I especially fear urinary infiltration of the sutures. These patients seldom show post-operative illnesses and are pretty comfortable from the start. Children are kept in bed two weeks after which they are gradually allowed to go about and may have their full freedom by the end of three weeks. The small scars resulting from the operation are not conspicuous (Fig. 208). The preservation of the navel leaves a better appearance of the abdomen. I recall only one infection which was superficial and did not interfere with the favorable plastic result. No umbilical herniae operated upon in the hospital in the last ten years have returned with a recurrence and there have been no deaths.

The *anatomic* diagnosis lay between metastatic carcinoma of the omentum arising from some primary focus at present unknown or bovine tuberculosis. The pearl necklace like character of the lesions and the youth of the patient only twenty seven years old made the surgeon more inclined to the diagnois of a bovine tuberculosis rare as that lesion is. As much omentum was pulled down as possible ligated and excised. All the sac was excised and the neck of the sac sutured. The wound was swabbed out with 5 per cent carbolic and the usual Bassini closure performed without drainage.]

If this be a metastatic carcinoma of the omentum it is the first case which I have seen causing a hernial incarceration. I cannot remember ever having run across the report of such a case in the literature. Of course these cases must occur occasionally but since they always end in fatalities the surgeon who observes them probably does not think of reporting them. Clinically metastatic carcinoma of the peritoneum is about as frequent as peritoneal tuberculosis and there are plenty of reports in the literature of tuberculosis of hernial sacs. Dr Victor Schrager¹ of our County Hospital staff made a careful study of hernial tuberculosis a few years ago in connection with a case of his own. He found the literature on the subject already extensive.

A A Worobjew (in the Wratschebnaja Gaz 1910 Nos 4 and 5) reported 40 cases of tuberculosis of hernial sacs including 5 cases of his own. In 15 of these cases the tuberculosis was confined to the sac alone. M Segre of Modena (Clinica Chirurgica December 1909) found 167 cases of hernial sac tuberculosis in the literature and reported 2 additional cases of his own. In 23 of these cases the tubercles were found only in the hernial sac.

The specimen that we have here however (Fig 209) is not like the ordinary case of subacute or chronic miliary tuberculosis in a hernial sac. The nodules are too large, too white and too hard for anything except a process of considerable duration. They have no tendency to break down in the center.

¹Schrager V Surg Gyn and Obst vol 12 No 3 1911

He has not been feeling quite so strong as usual, he thinks for about two weeks preceding the onset of his present trouble. He has had occasional cramp-like pains across his lower abdomen, not severe enough to double him up, for some time perhaps a few months. These cramps are usually relieved by bowel movement or passing gas. No night sweats at any time and no pain in chest or abdomen otherwise than has been mentioned.

COMMENTS AND OPERATION

We have to do here with an incarcerated hernia of some days' duration. It is hard, tender and nodular, and so evidently contains omentum. Since there has been no nausea or vomiting and no obstipation it is clear there is no obstruction of the bowel. The indication for operation is double. He has first an acute incarceration, which might readily lead to strangulation and should be operated in any event. Besides that, the pain and discomfort are keeping him from working. The nodular character and rather marked tenderness over the hernia are a little unusual for the average case of incarcerated hernia but hardly enough so to be striking. The patient is a little tympanitic over the abdomen, but not much more so than we see occasionally in constipated individuals.

Temperature was 98° F on admission to the hospital, pulse 64 and respiration 20. Systolic blood pressure was 116 diastolic 74. Urine negative for albumin, sugar, or casts. No white cell count was made.

Operation.—[The usual inguinal dissection was carried out. The sac was exposed and opened. On opening it its contents presented a striking picture. Nothing but omentum was present, but throughout it were numerous white, glistening nodules varying in size from a pinhead to a cherry. Some of the nodules were adherent to the sac, thus explaining the irreducibility of the mass. There were also nodules growing in the sac wall itself. On pulling down the omentum as far as it would come it was seen to be studded with similar nodules. Other nodules could be felt by the exploring fingers through the internal ring as far on each side of the peritoneal cavity as the fingers could reach.]

nodules clustering together that I have considered the possibility of this being a bovine tuberculosis (Perlsucht or 'pearl-disease' of the Germans) although I have previously seen only one such case involving the peritoneum. But carcinoma of a hernial sac is a rare condition too, and this patient being only twenty seven years old and having had no previous symptoms suggestive of an abdominal neoplasm, only some loss of weight 18 pounds and that during a period of severe physical exertion I am inclined to think bovine tuberculosis about as likely a diagnosis of this gross specimen as peritoneal carcinoma.

Subsequent Course—The patient made as uneventful a recovery as any uncomplicated incarcerated hernia. He ran no temperature at any time and had no postanesthetic vomiting or gas-pains. He left the hospital feeling completely recovered, as he said, on February 12th. A complete physical examination was made of him without eliciting the source of his primary growth. What was located however, was a large mass of secondary nodules about half the size of a fist in the rectovesical pouch. This mass pushed up the trigone and made a very striking protrusion upward into the bladder as seen in the cystoscopic examination carried out by Dr Harry Culver. The bladder mucosa was intact. The rectal mucosa was not adherent to the mass, but there was sufficient protrusion into the rectum, so that his constipation may be partly explained on this ground, though, no doubt the generalized carcinomatous peritonitis is at least an equal factor in impairing the muscle tone of his bowel wall.

He declined to stay for further x ray investigation and objected to having his stomach pumped out, because he said he felt perfectly well and wanted to go back to work.

Pathologist's Report (Dr John Nuzum)—The specimen consists of a portion of omentum composed of hard yellowish-white tumor nodules hanging in a bunch from the omentum and varying in size from a split pea to a walnut.

Microscopic examination Sections through the various tumor nodules reveal sharply circumscribed islands of atypical epithelial cells without glandular arrangement. These islands are walled off from one another by dense strands of connective



Fig. 209.—Carcinomatosis of omentum in a hernial sac (right inguinal) causing incarceration. Specimen spread out to show extent of the involvement.

either like an ordinary tuberculoma and have surprisingly little tendency to agglutinate with the adjacent structures or to make peritoneal irritation. It is because of these large pearly white

CLINIC OF DR. THOMAS J. WATKINS

ST. LUKE'S HOSPITAL

A CASE OF BICORNATE UTERUS COMPLICATED BY PARTIAL STRANGULATION OF AN OVARIAN CYST

Summary Attacks of acute abdominal pain associated with nausea and vomiting in a multiparous woman of twenty-seven physical examination—laparotomy—supravaginal hysterectomy, justification for hysterectomy in present case

THE following case is presented to you in order to illustrate the importance of taking into consideration the personal element as well as the pathology in determining the treatment in cases of abdominal pelvic surgery

Mrs M C, age twenty seven, married eight years, weight 131 pounds

Mother died of tuberculosis. The patient was operated for hernia and enlarged cervical glands seven years ago. For the past year has had severe pain in the right inguinal region which came on acutely and produced nausea and vomiting. Has had a number of these attacks which have lasted from one to three days.

Menstruation began at thirteen twenty eight day type duration four days, amount profuse. Fifteen to sixteen napkins are soiled at each period. The pain is severe and confines her to bed for one to three days.

There have been no pregnancies no vaginal discharge, and no vesical symptoms. Her general health is otherwise quite good.

Physical examination shows a swelling on the left side of the neck about 2 by 4 inches in size.

Pelvic examination reveals a pelvic tumor 4 to 5 inches in diameter posterior and to the right of the uterus. The uterus is

tissue. The stroma rather than the epithelial cells predominates throughout the sections.

Diagnosis Carcinoma simplex, metastatic in the omentum.

Comments -- There were no epithelial pearls to be seen in the sections, so it is probably not an epithelioma. A primary endothelioma of the peritoneum may present a not dissimilar picture both grossly and under the microscope, but is a rare lesion and scarcely to be definitely diagnosed without complete postmortem examination of all the organs in order to eliminate the possibility of a primary focus elsewhere. Carcinoma of the stomach and carcinoma of the rectum are the common forms of carcinoma in the young and since the proctoscope has eliminated the latter possibility a primary neoplasm of the stomach is the next most likely guess.

April 8 1918 The patient returned for observation, since he has not been feeling quite well since leaving the hospital. He has been accepted by the draft examining board, he told me but I forgot to ask whether it was before or after his operation that he was accepted. If he goes into service, Uncle Sam is likely to lose some insurance money besides having an invalid on his hands for a time. Of course if the patient applies for exemption and tells his story which can be verified by our records it is impossible that he should be accepted. I tried to get him to come back to the hospital for further study, but he made no definite promise.

If these metastases came from a stomach carcinoma which is probably the most likely source did they come by way of the lymphatics or by way of the free peritoneal cavity? Their distribution partly in the omentum and partly in the sac wall would speak in favor of the latter route of spread. A Japanese¹ some years ago when I was in Vienna published a careful histologic study of a case of extensive peritoneal carcinomatosis and proved very definitely that there was no lymphatic spread, that the primary tumor threw off cells into the peritoneal cavity and that the route of metastasis was exclusively along the peritoneal surface.

¹ Sjiamu, J. Leber die Genese des metastatischen Karzinoms des Peritoneums, *Siebold's Archiv* vol. ccxvi p. 32 1909.

fully weighed. The operative work is too often based entirely upon the pathology found. The individual consideration of the patient is extremely important, as emphasized in this case. If one were to determine the operation to be done in a case like this, the large uterus would be left and she would continue to suffer for years from dysmenorrhea and menorrhagia, which would materially lessen her resistance to the disease found in the cervical glands, and leaving the uterus would probably be of no benefit to her, as pregnancy is not likely to take place. It is very questionable if pregnancy, if possible in a tubercular patient, is justifiable. The probabilities of the neck glands being tubercular are increased by the family history of tuberculosis.

The question as to whether the amputation of the uterus should be high enough to preserve menstruation or low enough to stop it entirely is possibly debatable. The opinion is entertained by some that the life of the ovary is shortened by the artificial menopause. This would be an argument for the preservation of some menstruation. Personally, I do not believe that an artificial menopause shortens the life of the ovary. This opinion is based upon palpation of the ovaries of patients where an artificial menopause has been produced relative to their size. The amputation that leaves a moderate amount of the musculature of the body can be depended upon to preserve menstruation in a moderate degree.

crowded forward and to the left and feels about twice the normal size. The left ovary is palpable and normal.

Blood examination gives a white count of 7750 and a differential count about normal.

The diagnosis is cyst of the right ovary with twisted pedicle. A cyst is diagnosed, as the tumor and uterus move independently of each other on conjoined palpation. The acute intermittent pains which came on suddenly and which produced nausea are characteristic of twisted pedicle.

The uterus probably contains a small fibroid as there seems to be nothing else to account for the increased size. The uterus is uniformly of the same consistency, and no fibroid nodule is palpable.

Operation reveals an ovarian cyst with twisted pedicle and a bicornate uterus. The twist was not sufficient to materially affect the nutrition of the tumor, consequently the absence of febrile disturbance and of symptoms of pelvic peritonitis. The uterus is about one and one-half times normal size due to the congenital malformation. The appendix is very long, contains some concretions and shows some chronic changes.

Judgment as to what should be done is an important feature in this case. The tumor, of course, should be removed and the left ovary should not be removed on account of the influence of the internal secretions from the ovary, especially in a woman of her age. We believe that a supravaginal hysterectomy should be made, and be made high enough to preserve a moderate amount of menstrual flow. The reasons are:

- 1 She has severe dysmenorrhea.
- 2 She has excessive menstruation.
- 3 She is probably tubercular.
- 4 The probabilities of pregnancy are not good as she has been married eight years and has never been pregnant.
- 5 There is also the possibility that the cervical glands may be malignant.

We are firmly convinced that judgment in the case of pelvic abdominal surgery is extremely important, and that frequently all the factors which should enter into consideration are not care-

SYPHILIS WITH EXUDATES IN THE UTERUS, OVARIES, FALLOPIAN TUBES, AND LIVER

Summary Syphilis of uterus a rare condition pathology found at operation response to specific treatment

THIS case is presented as the pathology found is especially interesting and as such cases are extremely uncommon in the literature Dr Emil Ries is authority for the statement that there is no authentic case in the literature of syphilis of the uterus This is the most positive case that I have seen although I have had a few cases of pelvic exudates which I had considered syphilitic and which disappeared after the use of syphilitic remedies

Mrs H C , age twenty five weight 130 pounds—three years ago weighed 165 pounds

Family history and past illnesses negative

Present illness is loss of strength and uterine hemorrhage She never feels well although she has very few definite disturbances Her health has been failing for three years

Menstruations have become profuse and gradually lengthened, and she has now been bleeding for four weeks The last three menstruations have been of three or four weeks' duration She has had a small amount of white vaginal discharge for many years No vesical symptoms

Bowels constipated at times Appetite good Sleeps poorly She is separated from her husband and she says he had syphilis

Physical Examination —Abdominal examination is negative

Pelvic Examination —There are no signs of infection about the urethra vagina or cervix The uterus is in retroversion one and a half to two times larger than normal and is somewhat fixed It is impossible to reposit the uterus The uterine appendages may be slightly thickened but there is no distinct mass in the region of either ovary or tube She has very little increased pelvic tenderness

The Wassermann reaction is positive

the adhesions producing a recurrence of the displacement and it would be undesirable for her to bear syphilitic children.

An interesting feature is that there should be so much pathology with so few symptoms. She does manicure work as a profession and has not been obliged to give up work at any time. The pelvic adhesions have produced very few symptoms, as the pelvic symptoms have been almost entirely excessive menstruation. The liver adhesions have produced no symptoms.

There was no microscopic examination made for spirochetes in the tissue and the sections were consistent with the tissue being syphilitic.

Postscript—Recovery from the operation was uneventful, except there was slight bleeding from the edge of the abdominal wound, probably the result of the diminished coagulability of the blood due to syphilis. The amount of hemorrhage, however, was not sufficient to require any special treatment.

Inunctions of mercury were commenced soon after the operation and when she went home at the end of three weeks her general condition was much better than before the operation due probably to the beneficial effect of mercury.

Abdominal section reveals the uterus displaced backward and firmly adherent. The peritoneal covering of the uterus is subacutely inflamed and has somewhat the appearance of blisters over the entire surface except where adherent. None of the peritoneum of the uterus is normal. Adhesions involve the uterus both ovaries and tubes the posterior surfaces of the broad ligaments the sigmoid two or three loops of the small intestine and the omentum. They are thin and membranous in type. There is very little cellular infiltration and no pus. Both tubes have no pathology except the small amount produced by these membranous adhesions. The adhesions are not easily separated. It is necessary to clamp and tie some of them before cutting in order to be certain not to injure adherent loops of bowel. There are no enlarged glands found in the abdomen. It is especially interesting that there are no enlarged mesenteric glands as one would expect.

The appendix shows a moderate amount of chronic catarrhal changes. The gall bladder is negative. The anterior surface of the liver is adherent to the parietal peritoneum. These adhesions seem to cover the entire anterior surface of the liver. It is however impossible accurately to verify the extent of adherent surfaces as it is undesirable to break any of the adhesions. Gall bladder is normal on palpation.

She gave no history of any primary or secondary symptoms except she has had some sore throat which was probably syphilitic.

The operation consists in the excision of both tubes the body of the uterus and the appendix.

This case illustrates the importance of taking into consideration the personal element in determining the operative work to be done. It would be comparatively easy to shorten up the ligaments and keep this uterus in position to free the tubes and leave them as they are not closed and all the indications are to leave the ovaries. This we believe bad surgical judgment as the amount of denuded peritoneum is large and would result in more adhesions. The uterus is syphilitic and she probably would continue to have menorrhagia. There would be much danger of

CLINIC OF DR. GEORGE E. SHAMBAUGH

PRESBYTERIAN HOSPITAL

DEMONSTRATION AND DISCUSSION OF CERTAIN SURGICAL AFFECTIONS OF THE NOSE, THROAT, AND EAR

- Case I Acute mastoid infection with swelling appearing beneath the mastoid in the soft tissues of the neck—the Bezold abscess
- Case II Acute otitis media in a child, with abscess forming beneath and behind the ear
- Case III Chronic suppurative otitis media with protrusion of polyps through a fistula from the antrum through the upper posterior wall of the external meatus
- Case IV Chronic suppurative otitis media complicated by an acute mastoid abscess—significance of marginal perforation of the drum membrane
- Case V Serous labyrinthitis Technic of examination of the labyrinth The fistula reaction Indications for operation
- Case VI Empyema of the maxillary sinus
- Case VII Abscess of the sphenoid sinus Methods of diagnosis Operation—surgical anatomy of the sinus—route of approach
- Case VIII Chronic empyema of the maxillary sinus operation, severe hemorrhage, packing, systemic infection, and thrombosis
- Case IX Frontal sinus infection—comparative value of transillumination and sialography
- Case X Chronic abscess in the tonsil fossa following operation for enucleation of the tonsils Cause of persistent infection following tonsillectomy
- Case XI Singer nodule on the vocal cord
- Case XII Carcinoma developing on the true vocal cord
- Case XIII Cystic fibroma of the nasopharynx

CASE I. ACUTE MASTOID INFECTION WITH SWELLING APPEARING BENEATH THE MASTOID IN THE SOFT TISSUES OF THE NECK—THE BEZOLD ABSCESS

THE case is that of a Mrs. D., age fifty four, who developed, the latter part of August, 1917, acute otitis media in the right ear. At the onset of the trouble she suffered some from pain over the mastoid, but this apparently subsided soon after the ear began to discharge, and for six weeks the patient was free

relief of the discomfort which was caused by the swelling developing below the mastoid. When I first saw her the patient objected very strongly to any operation, but ten days later returned and was quite willing to be operated.

In exposing the mastoid process we discovered a small fistula in the outer cortex near the tip, from which pus was oozing. In cleaning out the mastoid process we noted that there were very few pneumatic spaces in the upper half of the process, and at the tip there were only two or three moderate sized cells. These were filled with pus, but there was no very distinct softening of the bone. The small size of the suppurating spaces at the tip of the mastoid suggested at once that the main source for the profuse discharge of pus from the external canal must have been from some other focus. The fact that the patient showed no evidences of any complication except a swelling in the neck excluded the probability of an extradural abscess, so I directed my attention to the region in the neighborhood of the mastoid tip. After a little patience I discovered an opening which led from the mastoid into a cell lying internal to the digastric groove. Here a rather large cell was entered, which was filled with pus. This was curedt out carefully, and the opening into the mastoid process proper was enlarged by the use of the curet. In dressing the wound care was taken that the gauze strip was passed into this deeper lying cell.

The presence of these large spaces which sometimes lie internal to the digastric groove should always be kept in mind in operating upon the mastoid. It is a region where exploratory work cannot be readily carried out inasmuch as these spaces lie deeper than the facial nerve, and careless operating might very readily result in the severing of this important structure. To explore extensively this region as a routine in mastoid operations is of course, not justified, and it is only in just such cases as the one here reported where the profuse discharge from the external canal can hardly be accounted for from conditions discovered in the mastoid process itself, that one is justified in extending the operation to an exploration of this region.

I have some very interesting anatomic preparations showing

from symptoms except the annoyance of profuse purulent discharge from the ear. Six weeks after the onset of the ear trouble the discharge suddenly ceased. A couple of days later she began to be annoyed by swelling and discomfort located below the mastoid and along the line of the sternomastoid muscle extending around in the region of the parotid.

I saw the patient for the first time soon after this developed. There was no tenderness whatever over the mastoid except at the tip and this did not seem to be very marked. The swelling below the mastoid was very hard and resembled the condition which one meets with in cases of malignant tumor in this region. The patient had a temperature of 100° F. and a leukocyte count of 12,000. The external canal was quite dry but the drum membrane still showed evidences of the protracted acute suppuration. The development of the local symptoms in the neck shortly after the cessation of the discharge suggested very strongly a perforation of a mastoid abscess. Early otologists had observed the phenomenon where the cessation of a discharge from the ear was followed in a very short time by the development of serious intracranial symptoms and had drawn the conclusion that it was a harmful thing to check a running ear as the checking of the discharge might lead to fatal complications. As a matter of fact the cessation of the discharge in such cases takes place as the result of the perforation of a mastoid abscess. If this perforation takes place externally all well and good there develops a local abscess in the neck or over the mastoid. If the perforation takes place internally the onset of severe symptoms heralds the onset of an intracranial complication either meningitis, sinus thrombosis or brain abscess, any one of which of course is very apt to end fatally. In such cases the disappearance of the discharge from the external meatus is usually only a temporary one. After a few days the discharge usually returns and becomes quite as profuse as before. In this case which I am discussing the disappearance of the discharge from the external canal lasted for the larger part of a week when large quantities of pus began to appear in the external canal. This did not seem to be associated in any way with

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these large cells which lie internal to the digastric groove. One of these preparations is shown in Fig. 210. An infection of one of these deep-lying cells may, of course, take place independent of any acute infection of the cells which may lie at the tip of the mastoid, and under these circumstances the diagnosis would be extremely difficult, especially because nothing will be shown over the external surface of the mastoid. When the infection in one of these cells breaks through externally no symptoms appear over the mastoid, but a swelling develops somewhere in the neck, the reason being that the pus is confined beneath the deep



Fig. 210.—Section through the mastoid process. Note the large pneumatic cell lying internal to the digastric groove.

fascia of the neck. This condition is what is commonly called the Bezold type of mastoiditis.

I operated on a case a few years ago for acute mastoid abscess. The case was that of an adult of fifty. The operation itself included a removal of the entire tip and a complete extirpation of the mastoid process. The mastoid cavity closed promptly, but the patient persisted in complaining of pain indefinitely located in the region of the affected mastoid. This kept up with varying severity for a full month after the mastoid wound had entirely healed. The patient showed only an appreciable rise in temperature; it was normal part of the time, and only occasionally would it rise at all above 99° F. The

leukocyte count was also scarcely above what could be considered a normal condition, yet the patient complained bitterly of the pain Careful neurologic examination disclosed no evidence of intracranial trouble We were inclined to consider the patient a neurasthenic It was not until fully a month after the healing of the mastoid when we detected the beginning of a swelling in the neck, apparently coming from the deep tissues and about midway between the clavicle and the tip of the mastoid After this swelling became quite distinct we made an incision through the skin and with dull forceps burrowed deep in the tissues of the neck, finally opening into a deep-seated cervical abscess, the opening of which entirely relieved the patient from his suffering It was necessary to wear a rubber tube drain for several weeks before the pus stopped discharging Here was another case where a deep seated pneumatic space outside the usual confines of the mastoid process itself was the seat of infection and in which the exenteration of the mastoid failed to discover this focus The pus finally broke into the tissues of the neck under the deep cervical fascia and under the sternomastoid muscle and appeared as a swelling low down in the neck Nothing appeared in the region of the mastoid process itself Of course, neither x rays nor any other method of examination can help us very much in this sort of a situation

CASE II. OTITIS MEDIA IN A CHILD WITH ABSCESS FORMING BENEATH AND BEHIND THE EAR

This child aged fourteen months, was referred to me in February, 1918, because of a supposed mastoid abscess The child had been suffering from severe acute otitis media in both ears for two weeks The swelling beneath the ear had made its appearance two days before he was sent to me Examination disclosed a profuse purulent discharge from both ears The membrane lining the external meatus was the seat of a severe otitis externa On one side a swelling about the size of a hazel nut appeared below and back of the auricle just below the region of the mastoid This swelling resembled, both in its location and appearance, the infiltration described in the case

just reported and as in this case there were no changes whatever in the region of the mastoid itself.

A knowledge of the anatomy of the temporal bone at this age excluded at once the possibility of a Bezold mastoiditis such as was found in the previous case. The diagnosis of an infected lymph gland was made. Hot boric acid dressings were applied for a couple of days and when the gland had undergone complete softening a small incision was made through the overlying skin and the contents of the suppurating gland removed with a curet. The child made a prompt recovery.

Swelling over the mastoid develops quite readily in acute otitis media in a child of this age but this swelling is always located more above and back of the auricle and never below as in this case. The reason for this location of a mastoid infiltration in a young child is as follows. There are no mastoid cells in an infant the antrum being the only pneumatic space back of the tympanum and this cavity is placed above and back of the attachment of the auricle. There is no mastoid process. For this reason it is of course not possible for a mastoid abscess to rupture and form a swelling as in this case below the auricle. A suture between the squamous and petrous parts of the temporal bone passes through the outer wall of the antrum. In a young child this suture is still open and blood vessel communications extend between the membrane lining the antrum and periosteum over the region of the antrum. An acute otitis media in an infant readily causes a swelling back of the ear. When such a swelling develops before the drainage through the drum membrane has been established too much importance need not be attached to the symptom since as a rule the swelling will subside spontaneously after the drum membrane has been opened and drainage from the tympanum established. When a subperiosteal abscess develops back of the ear the condition does not require the extensive mastoid operation that is required in an adult. In many cases the condition heals readily after making a simple Wild incision that is an incision through the swelling cutting through the periosteum. Such an incision in an infant accomplishes the same object as the opening of the

antrum in the adult since with the more or less patulous petrosquamosal suture described above the Wild incision drains the only pneumatic space back of the ear, the antrum. In not a few cases however, the bony covering of the antrum has undergone softening or has even developed a sequestrum. In such cases the Wild incision will not suffice but it must be followed by a careful removal of the diseased bone by means of a sharp curet. The difference between the anatomy of the temporal



Fig. 211.—Temporal bone of a newborn child. Note the patent petrosquamosal suture which permits infection from the antrum extending directly to the periosteum over to the temporal bone. Note also the absence of a bony external meatus and the relation of the opening of the canal for the facial nerve just below and back of the tympanic cavity.

bone of an infant and that of an adult must be kept in mind else one may cause irreparable injury by an operation in this region in a young child. There is in the first place no bony external meatus the membranous canal being attached to a rim of bone to which the drum membrane is also attached and which is called tympanic bone. In the second place the facial nerve does not escape from the bone beneath the tip of the mastoid process as in the adult for the simple reason that there is no mastoid process in an infant. The opening for the nerve is on

the outer wall of the temporal bone at the lower posterior angle of the external meatus. An incision over this region might easily sever the facial nerve (Fig. 211)

CASE III. CHRONIC SUPPURATIVE OTITIS MEDIA WITH PROTRUSION OF POLYPS THROUGH A FISTULA FROM THE ANTRUM THROUGH THE UPPER POSTERIOR WALL OF THE EXTERNAL MEATUS

The case is that of a child aged nine, who was brought to me in February, 1918, with a history that she had had a chronic discharging right ear for the last two years. On examining the case I found that the fundus of the meatus was filled with granulations. There was only a moderate amount of discharge from the ear, but this was of a distinctly purulent character and had a very offensive odor. The symptoms were unmistakably those of a process which was invading the bone. I gave instructions to have the ear irrigated twice a day and a solution of boric acid in alcohol dropped in the ear, and asked them to return in a week's time, and for the father to come with the child in order that I might have an opportunity of explaining the situation and getting his consent to the necessary operation. Ten days later the child was brought to my office and appeared quite ill. I found that she had a temperature of 103° F. and had been complaining of a great deal of headache, which was not restricted to the region of the ear especially but was confined to the right side of the head. Examination of the ear disclosed no alteration in the condition which I had previously seen. The patient was put in the hospital and a more exhaustive examination made. The urine was found to be normal there was a leukocytosis of 14,000. The child had a distinct congestion over the faecal tonsils indicating a slight attack of tonsillitis but we found nothing further in the examinations to account for the temperature except the conditions in the ear. A few days later the patient's temperature had largely disappeared—she still had 99° F. The headaches had practically gone and she felt in every way very much improved. Examination at this time disclosed a mass of polyps which had broken through the

upper posterior wall of the canal and blocked up the external meatus. These granulations had broken through from the antrum and apparently the rise in temperature was due to the retention of pus behind these granulations. With the formation of an opening into the external canal and the protrusion of the polyps the pain was relieved and the escape of pus was followed by a drop in the temperature. Two days later a radical mastoid operation was performed. A cholesteatoma was found filling the attic aditus, and antrum. No remnant of the ossicles could be discovered.

The location of the antrum is above and posterior to the external meatus. It does not lie as deep as does the tympanum, but is placed out along the external canal. In cases of acute otitis media with severe reaction in a mastoid process it is not uncommon for a periostitis to develop in the membrane lining the external meatus directly over the region of the antrum. This periostitis will produce a sinking of the upper posterior wall of the bony canal just external to the attachment of the membrane tympani. The significance of such a swelling in the external meatus is exactly the same as that of a periostitis over the surface of the mastoid process back of the ear. The presence of such an infiltration is a well recognized indication for a mastoid operation even though there may be no changes over the outer surface of the mastoid process. In such cases if the patient refuses to have the mastoid cleaned out a fistula forms sooner or later in the upper posterior wall of the bony meatus, allowing the pus to escape from the mastoid abscess into the external canal. I have seen this occur in several cases. The end result will be the same as when a neglected mastoid abscess is allowed to break over the outer surface of the mastoid process. There will be a more or less prolonged discharge of pus which may either finally clear up with the closure of the fistula or it may be indefinitely prolonged the process being kept up because of the presence of dead bone in the mastoid.

If we could be sure that every case of acute abscess formation in the mastoid would break externally either by perforating the upper posterior wall of the external meatus or the outer surface

of the mastoid process the prognosis of acute mastoiditis would be much more favorable than it is in reality. As a matter of fact the same process of softening of the temporal bone which permits of external rupture of the mastoid abscess may just as readily lead to a rupture internally with the development of an intracranial complication such as sinus thrombosis meningitis or brain abscess. Such complications very often lead to a fatal termination.

In cases of chronic otitis media it is less common for symptoms to develop along the upper posterior wall of the external meatus just as it is more uncommon for symptoms to develop over the outer surface of the mastoid process. The reason is that in chronic otitis media by a process of osteosclerosis a hardening of the shell of the mastoid takes place which makes it quite difficult for the disease to make its appearance through an external opening. I have seen chronic mastoiditis result in a rupture through the external meatus in very few cases. The development has always been heralded by the presence of rather persistent severe pain and has been followed by the protrusion of a mass of granulations into the external meatus. The underlying pathologic process going on in the mastoid process which has led to the erosion of the bony wall has in the cases observed by me always been the existence of a cholesteatoma.

It is possible for a chronic mastoiditis with cholesteatoma formation to result in what amounts to a practical spontaneous cure through the development of a fistulous opening into the external meatus which permits of a spontaneous extrusion of the cholesteatomatous masses. Where this spontaneous opening is large enough to permit eventually after the cholesteatoma has been evacuated of the more or less free ventilation of the diseased cavity the activity of the cholesteatoma becomes very much diminished that is the process of erosion of the bony walls as a result of the pressure from the cholesteatoma formation disappears. I have seen a number of just such cases where there is no necessity for any operative interference because there is taking place spontaneously the development of a situation quite similar to that which results from the radical mastoid

operation. On the other hand, a cholesteatoma which has resulted in a rupture in the external canal in which the canal remains filled with granulations which interfere with the escape of the cholesteatoma requires the radical mastoid operation.

An interesting complication occasionally presents itself in these cases. If the hearing in the opposite ear is very poor and the patient relies largely upon the affected ear for hearing, one has to be very cautious about performing a radical mastoid operation, inasmuch as this operation is not infrequently followed by very distinct lowering of the hearing function. In



Fig 212.—Section through mastoid process and external auditory canal showing relation of the tympanic antrum as it lies above and posterior to the external auditory meatus. A pneumatic mastoid process with large cells lying along the periphery and especially at the tip of the mastoid.

cases where the operation for the relief of an active cholesteatomatous process becomes imperative, and where the patient relies upon the affected ear for hearing, I have adopted a modified form of operation one which removes the upper posterior wall of the canal as far down as the attachment of the drum membrane, but which does not disturb the structures in the tympanic cavity. The plastic operation in the membranous external meatus is carried out exactly as after a complete radical mastoid. The end results of this modified radical mastoid is by no means as satisfactory as where the complete operation

is performed. There is likely to be a persistence of discharge even after the operation, even though the operation itself has eliminated the most dangerous element, namely, the erosion of the bony walls of the antrum. There is not infrequently a persistence of discharge after a complete radical mastoid operation, the discharge being due to a patulous eustachian tube with a persistent or recurring infection as the result of a tubal catarrh. No one takes this sort of situation seriously. It is not an element of danger, and does not have the significance which a chronic running ear had before the mastoid operation eliminated the diseased process from the attic, aditus and antrum. The persistence of moisture through a patulous eustachian tube is not an element of danger, and is, on the whole, of very little annoyance to the patient (Fig. 212).

CASE IV CHRONIC SUPPURATIVE OTITIS MEDIA COMPLICATED BY AN ACUTE MASTOID ABSCESS—SIGNIFICANCE OF MARGINAL PERFORATIONS OF THE DRUM MEMBRANE

This case is that of a young man twenty-five years old with a history of a chronic purulent discharge from the right ear dating from childhood. The patient consulted me March 5, 1918. There had been times when the external evidence of discharge disappeared for a longer or shorter period, but for several years there had been a persistent discharge. On several occasions polyp masses had been removed from the external canal. For two weeks before consulting me the patient had been suffering from very severe pain over the right side of the head. At times only was the pain localized over the region of the mastoid. The physician in charge stated that he had never detected any elevation in temperature nor any symptoms indicating any trouble other than that in the ear.

An examination disclosed no external evidence of trouble over the mastoid process. The region over the mastoid on one side did not show any more tenderness on pressure than that on the other side. In the external canal there was a distinctly purulent discharge with an offensive odor. The perforation in the drum membrane was located in the lower posterior quad-

rant was marginal in character and the region about the opening was the seat of small granulations

Marginal perforations are usually found in the upper posterior segment or in Shrapnell's membrane. It is unusual to find such a perforation in either the lower posterior quadrant of the membrana tympani or in the lower anterior quadrant. The significance of a marginal perforation especially when there is present an offensive discharge even though this discharge may be very slight is always an unfavorable sign. The reasons for the serious significance of a marginal perforation are these. In the first place a marginal perforation means an erosion of the adjacent bony structure a condition that quite frequently is associated with an erosion deeper in the mastoid—a condition in other words which has in it distinct elements of danger from a possible intracranial complication. In the second place a marginal perforation seems to be a necessary factor in the development of the most serious type of chronic otitis media that is the type where a cholesteatoma formation exists. A cholesteatoma is formed by the invasion of the middle ear chambers from the skin lining the external canal. This skin when subjected to the conditions existing in the middle ear chambers especially the presence of moisture and a lack of ventilation begins to exfoliate and eventually fills these cavities with a mass which we call the cholesteatoma. Now the invasion of the middle ear chambers by the epidermis from the external canal never takes place through a central perforation no matter how large this perforation may be. The invasion apparently can take place only over the region which is prepared that is flattened out by the erosion of a marginal perforation. Such marginal perforations as stated above are located usually in the upper posterior quadrant or in Shrapnell's membrane. I have seen a small marginal perforation in the anterior lower quadrant which led to the formation of a cholesteatoma back in the antrum.

In the case reported here the perforation was small it was marginal and there was present an offensive odor to the discharge as well as granulations the combination of symptoms

which points to a diseased process which is invading the bone—a process, in other words, that is not free from a possible dangerous complication, and, therefore, one which as a rule requires the radical mastoid operation. A probe introduced through the perforation led to a fistulous passage extending directly backward toward the mastoid. This fistulous passage appeared to be distinctly deeper than the canal for the facial nerve, which at the level of the floor of the tympanum lies several millimeters external to the internal wall of the tympanum, that is cut along the external meatus.

Because of the history of severe pain the case was operated that same day. The outer shell of the mastoid was sclerosed and thickened just as we expect to find it in long-standing otitis media. There were no pneumatic cells encountered anywhere in the mastoid. In the lower part of the process we uncovered an abscess cavity the size of a small hazelnut, located very deep and apparently connecting with the tympanum through the fistulous passage described above which opened in the marginal perforation in the lower posterior quadrant of the drum membrane. The bone lying between the abscess cavity and the antrum a distance of $\frac{1}{2}$ to $\frac{1}{4}$ inch showed no evidence of disease. The walls of the abscess cavity were distinctly softened. An examination of the hearing had disclosed the fact that the patient had scarcely any hearing in the right ear, while the left ear was normal. For this reason we did not hesitate to perform a complete radical mastoid operation which meant the exenteration of the attic and tympanum as well as the mastoid. The ridge for the facial nerve was carefully preserved although as stated above the opening from the tympanum into the mastoid abscess appeared to pass deeper than the facial canal. Only at one time during the operation did there appear to be a possible twitching of the facial. This was when a blunt probe was introduced into the opening in the floor of the tympanum. There was a good deal of oozing when the operation was completed, and for this reason the tampon in the external canal was placed rather firmly. When the patient was seen a couple of hours after the operation he had already come out from under

the anesthesia and there was no suggestion of lack of function in the facial nerve. The next morning however a distinct but not complete paresis of this nerve was present. Believing that the pressure of the tampon may have had something to do with this the packing was removed and a looser pack inserted.

It is now but one week since the operation and the action of the facial nerve remains apparently the same as on the day following the operation. It is not a complete paralysis.

I have seen several cases where a partial (in one case a complete) paresis of the facial nerve followed a day or two subsequent to the operation and my impression is that the packing or the inflammatory reaction following the operation has been the cause. In none of these cases has the paralysis been permanent. It disappears as a rule much more readily than where the nerve has been severed during an operation. The longest case was where the paralysis existed for about six weeks before it had disappeared to the extent that no deformity could be noticed. In one case development of the paralysis took place several days after the operation and followed in a few hours after a repacking which had been carried out by the intern in order to control what appeared to be rather severe bleeding.

I have also seen facial paralysis develop subsequent to a mastoid operation which was caused by acute infection in the soft tissues of the neck just below the mastoid. This paralysis also disappeared spontaneously after the subsidence of the inflammatory infiltration.

CASE V SEROUS LABYRINTHITIS

Mrs T aged forty consulted me first in September 1913 when she was brought to the Presbyterian Hospital complaining of extreme vertigo nausea and vomiting which had developed ten days previous.

She gave a history of a discharge from the left ear of twelve years duration. The discharge had never been very great in amount and had caused her no especial annoyance. She did not think that she had been able to hear for some time in the affected ear. The development of vertigo and nausea was

associated with distinct sensations of stuffiness in the affected ear. The patient had distinct rotary nystagmus directed toward the normal side. When seen by me the nystagmus was only present when the eyes were turned toward the normal side, and disappeared entirely when they were turned to the affected side.

Examination of the ear disclosed a perforation in the upper posterior margin of the membrana tympani. A mass of granulations protruded from the opening. There was very little offensive odor to the discharge. In testing the function of hearing the right ear was normal, but the whispered voice could not be heard in the left ear. Of course, when one whispered very loudly close to the ear, even with the right ear closed, the patient could hear, but that this hearing came through the normal ear was readily demonstrated by having her close the left ear as well, when it was found that the whispered voice was heard just as distinctly as when the left ear was left open. The tuning fork applied to the median line of the head always lateralized toward the affected side. This reaction in the Weber test is the characteristic reaction of a deafness caused by obstruction in the sound-conducting mechanism. In labyrinthine deafness in one ear, especially when it is not associated with marked middle-ear trouble, the tuning fork is usually lateralized toward the normal side.

A very interesting and significant finding in the functional tests was that the hearing was not entirely gone in the affected ear. The a^1 tuning fork could be distinctly heard in the affected ear. The c^4 tuning fork was also still heard, but very indistinctly in the affected ear.

The tests were made to ascertain whether a fistula had formed into the labyrinth. Such fistulae are not uncommon in cases of chronic suppuration and are often present in cases where labyrinthitis develops secondary to chronic middle-ear suppuration. Compression of the air in the external canal will, in the presence of a fistula in the labyrinth, usually suffice to produce enough motion in the endolymph to set up very characteristic responses—development of vertigo and nystagmus. A fistula usually forms in the horizontal canal where this lies exposed in the floor

of the antrum. By the compression of air in the external canal slight depression of the granulations covering the fistula can be made which will cause the endolymph to flow from the fistula forward in the horizontal canal toward the vestibule. The result will be the development of a very marked horizontal nystagmus with a quick component directed toward the affected side. Now by reversing the procedure and causing suction in the external canal an endolymph movement from the vestibule across the ampulla of the horizontal canal is produced and a nystagmus directed toward the opposite side now develops. This is the characteristic fistula reaction. No evidence of a fistula was detected in this case.

I made efforts to determine whether any function at all persisted in the semicircular canals. This was done by irrigation of the external meatus with hot and cold water. The responses that we obtain by such methods where the labyrinth is still intact are very characteristic: with cold water irrigation there develops distinct rotary nystagmus, with a quick component directed toward the opposite side, whereas with warm water irrigation a rotary nystagmus develops directed now toward the affected side. In this case no response could be obtained from either hot or cold water.

On September 22, 1913, under a local anesthesia I snared off the granulations protruding into the external meatus.

A very important clinical problem presented itself in this case. Here was a patient suffering from a chronic suppurative otitis media, the type where the temporal bone is distinctly invaded, in other words, a type which does not get well spontaneously and in which there is always present the possibility of a serious complication developing. The patient was suffering from an acute invasion of the labyrinth. An infection of the labyrinth from otitis media is in itself not free from danger. A diffuse suppuration of the labyrinth very frequently leads to an extension through the internal meatus and the development of meningitis or a cerebellar abscess. The milder form of labyrinth infection, which we term "serous labyrinthitis," rarely, if ever, results in a serious complication. In this case

it could be determined definitely that the patient still had a remnant of the hearing function in the affected ear. This fact was sufficient to exclude the possibility of a diffuse suppuration of the labyrinth and gave us the diagnosis of a serosis rather than a purulent labyrinthitis.

A case of chronic purulent otitis media especially of the type such as this where the radical mastoid operation is indicated which develops as a complication a diffuse suppuration of the labyrinth calls for an immediate operation, and the operation consists of the radical mastoid followed by the extirpation of the labyrinth itself. A radical mastoid operation under these circumstances which leaves the diffuse suppuration of the labyrinth untouched is very liable to cause an extension of the labyrinth suppuration to the brain cavity with a fatal complication. Cases of labyrinthitis of the milder type that is cases where there has not been a complete suppression of the labyrinth function never call for an operation on the labyrinth. There are two reasons for this conclusion one is that the milder types of labyrinthitis do not lead to an intracranial complication and the second is that while there is still function in the labyrinth a greater or less restoration of this function may be expected after the subsidence of the acute reaction.

In the case under discussion the clinical indications for a radical mastoid operation existed but an operation upon the labyrinth itself was contraindicated. It seemed unwise to proceed immediately with the mastoid operation in the presence of the acute labyrinthitis so we kept the patient in the hospital for ten days until the vertigo had largely disappeared when she was sent home.

The patient returned on October 20th. She was still annoyed from the disturbance of equilibrium. The functional examination of the ears disclosed the same findings as the first examination. There was no spontaneous nystagmus but the patient was still able to hear in the affected ear. The radical mastoid operation was performed from which the patient made an uneventful recovery.

We had an opportunity of examining the patient in October

1917, and found that the affected ear responded readily to caloric stimulation. This was carried out not by irrigation of the ear, as this might very easily set up a discharge, but by driving a stream of compressed air into the external canal. The patient very promptly developed nystagmus, directed, with a quick component, to the opposite side. The hearing tests were of especial interest—the patient not only heard the whispered voice—indistinctly, of course—but was able to hear all of the tuning forks. One peculiar phenomenon observed in her case was that all of the forks below the C⁴ were heard as a different pitch than in the normal ear. This is known as diplacusis, and when present it always indicates some trouble in the internal ear. The phenomenon is produced by deposits of some sort on the vibrating mechanism in the labyrinth, that is, the mechanism which responds in sympathetic vibrations to tones from the external air. This vibrating mechanism in the labyrinth we believe to be the membrana tectoria. Different parts of this membrane respond with sympathetic vibrations to tones of different pitch. The same part must always respond to the same tone otherwise the patient has difficulty in recognizing the pitch of a tone. Now anything which weighs down this vibrating mechanism, as, for instance, a fibrin deposit, such as might easily happen in the presence of a serous labyrinthitis would cause the segment so weighed down to respond to a different tone than it would normally, and thus produce the phenomenon known as diplacusis.

CASE VI. EMPYEMA OF THE MAXILLARY SINUS

Mr C M (Fig 213), age twenty nine, was referred to me in February, 1917. His complaint was purulent secretion from the left side of the nose, of which he has been conscious for several years. He had suffered a good deal from frontal headache in the region of the left frontal sinus and had been advised several times to have an external operation on the left frontal sinus.

Examination of the nose disclosed pus oozing out from under the middle turbinal body on the left side. Transillumination showed a shadow over the left maxillary but the right maxillary

and both frontal sinuses appeared clear. Irrigation of the left maxillary sinus by the introduction of a Killian tube in the middle meatus washed out a large amount of foul-smelling pus. Irrigation of the left frontal sinus disclosed no evidence of disease.

On February 7th, under local anesthesia, the middle turbinate body was removed and a large opening made into the maxillary sinus through the middle meatus.

The patient was seen again on February 13th, when the odor and secretion had disappeared. On May 7th the patient was



Fig. 213.—Section through the nose showing the lateral wall. Middle turbinated body elevated. Opening in the middle meatus through the nasal fossae into the maxillary sinus.

again examined when the sinus was still found free from secretion. In making the transillumination test the shadow over the maxillary sinus still persisted. The annoyance from frontal headache had disappeared.

The case is especially interesting because of the symptoms over the frontal sinus whereas the maxillary sinus was the seat of the trouble. This is not at all an uncommon condition. The case emphasizes the importance of not attempting to make a definite diagnosis of frontal sinus infection from the presence of frontal sinus pain and the discharge from the nose.

CASE VII ABSCESS OF THE SPHENOID SINUS

The case is that of a man aged forty eight, who consulted me January 15, 1918, complaining of persistence of severe frontal headache, coming on early in the morning and lasting, as a rule, for a couple of hours, sometimes persisting most of the day. The trouble developed early last October, and he does not recall that its development was associated in any way with nasal symptoms or symptoms of a head cold. During the past six weeks there has developed, in addition to the frontal pain, severe pain in the region of the occiput. Neither the frontal nor the occipital pain was lateralized. The patient has not been able to work since the onset of this trouble. He had a sallow, haggard look, and had an appearance which suggested serious illness. The case had been treated as one of suspected frontal sinus infection, although no operative measures had been carried out. Inspection of the nasal passages convinced me at once that there was no trouble in either the frontal or maxillary sinuses, for the reason that there were no evidences of any changes whatever in the mucous membrane of the middle meatus, that is, the space lying under the middle turbinate body. Into this space opens three of the nasal accessory sinuses, the maxillary, the frontal, and the anterior ethmoid cells. Any infection of one or more of these sinuses produce, as a rule very characteristic changes in the mucous membrane, which presents itself at the mouth of the middle meatus. The membrane is swollen, edematous, congested, and usually, at least after the application of cocaine which results in shrinking of the tissue, purulent matter appears under the middle turbinal body. In this case there was no difficulty in inspecting the middle meatus on both sides, and on neither side was there any change whatever suggesting infection of the anterior series of nasal sinuses. After cocaineizing the membrane of the nose by means of a cotton applicator, using a 1 per cent solution, I soon discovered that on the left side there was a suspicious appearance of the mucous membrane lining the space between the middle turbinate body and septum. The membrane had an edematous appearance, was swollen, and even after prolonged application of 1 per cent

cocain solution could not be reduced so that it was possible to inspect this passageway. This space between the middle turbinal and the septum is known as the common meatus of the nose, or the olfactory space. It is also sometimes referred to as the superior meatus. The term "superior meatus," however, is technically applied to another region more restricted. After applying cocaine in the manner described above the patient was placed with the head forward and allowed to remain quietly for ten minutes. When I saw him again I found that he had saturated his handkerchief with secretion which had been pouring from the left side of the nose. Inspection disclosed a quantity of creamy pus coming down between the middle turbinal and the septum. Skiagrams made of the head showed the antrums normal frontal sinuses small but no evidence of trouble in these sinuses. A very interesting condition was found in the sphenoid sinus. Instead of the sharply defined outlines of this sinus, the open space was obliterated, and the outline shaded off imperceptibly in the surrounding structures.

The man had suffered so much during the four months of his illness and was so hypersensitive that it was hard to persuade him to have an operation on the nose. He was prepared by giving him $\frac{1}{4}$ grain of morphine hypodermically, with atropin, fifteen minutes before time to operate. The nasal passage on the left side was thoroughly cocaineized, using a 5 per cent. solution of cocaine made up in 1:5000 adrenalin solution. Pledgets of cotton saturated in this solution were pushed in between the middle turbinal body and the septum, and the region of the middle turbinal itself was treated in the same way. These cotton pledges were removed at the end of ten minutes but still there was by no means the complete cocaineization which one gets in most cases where this method is used. The operation consisted in the removal of the middle turbinated body as a preliminary step. This was done by making an incision $\frac{1}{2}$ inch deep along its attachment at the anterior end. The loop of a wire snare was then passed over this part of the turbinated body, and the whole structure drawn out of the nose, pulling it loose from its attachment. With a suitable nasal forceps the pos-

terior half of the ethmoid labyrinth was exenterated and the anterior wall of the sphenoid sinus freely exposed (Fig. 214). Very little difficulty was experienced in removing the anterior wall of the sphenoid sinus or a large part of this wall by means of a sphenoid sinus bone forceps. This part of the operation

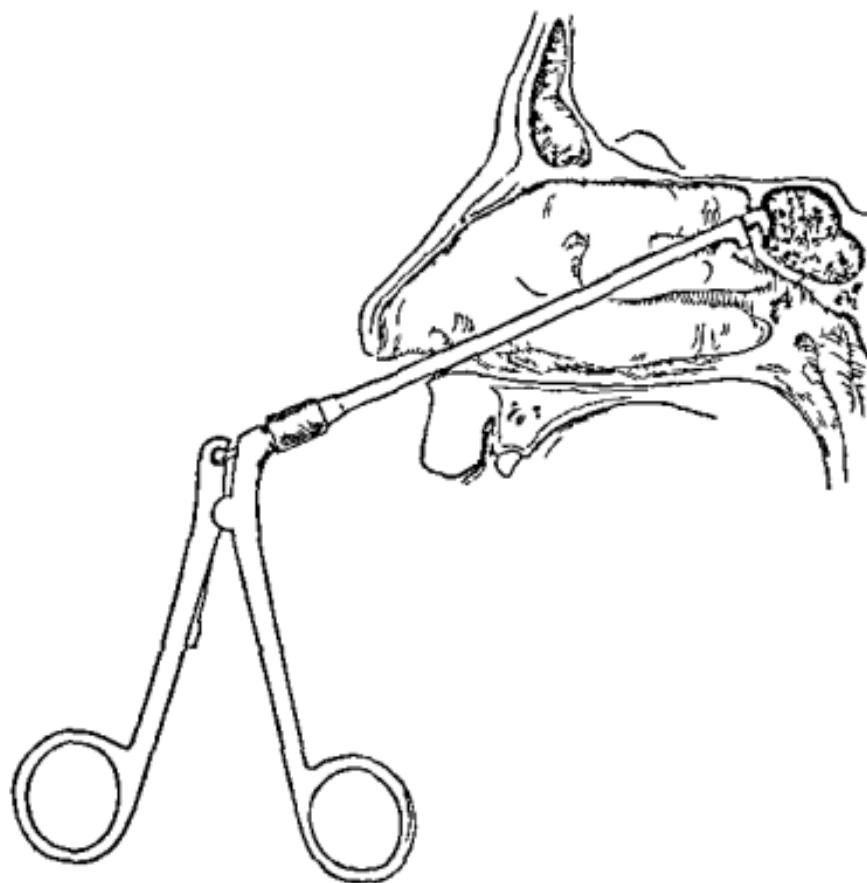


Fig. 214.—Section through the nose showing the normal opening of the sphenoid sinus and the bone forceps in place for the removal of the anterior wall in the operation for the cure of chronic empyema of the sphenoid.

occasioned considerable pain but the whole operation did not last more than a couple of minutes as we were not retarded because of any severe hemorrhage. The material which escaped from the sphenoid sinus showed inspissated white colored crumbly masses which suggested the appearance of the secretion which one washes out from cases of chronic otitis media.

where a cholesteatoma is present. An unusually large sphenoid sinus was uncovered. It was not found necessary to introduce any nasal packing. The patient remained in the hospital for a couple of days. At the end of this time his headaches had entirely disappeared. No subsequent treatment was carried out. The patient was seen again on February 9th. Examination at this time disclosed no evidence of any sinus trouble. The pathologic conditions had entirely cleared up. His headaches had disappeared and the patient's general condition had again become normal.

Infection restricted to the sphenoid sinus in which other nasal accessory sinuses are not involved is rather the exception. One sees a great many cases of acute nasal infection where several of the nasal accessory sinuses are involved. In this case the disease was found in the posterior ethmoid cells as well as in the sphenoid. The operation for the relief of an empyema of the sphenoid is, on the whole, less difficult than that of the frontal sinus, but more difficult than an intranasal operation on the maxillary sinus. The risk of such an operation lies usually in failure to appreciate the anatomic surroundings. If one attempts to break through the anterior wall of the sphenoid by use of a curet there is great risk that when one enters the sinus the end of the instrument will cross the sometimes narrow space and break through the rather fragile upper posterior wall. Such an accident is likely to be followed in a couple of days by meningitis. The treatment of a sphenoid sinus disease severe enough to call for an operation is the same as that for any of the nasal accessory sinuses. The first thing is to secure ample ventilation. Irrigations, topical applications of medicated solutions, etc., are entirely unnecessary. Exception should be made however, for cases where granulations spring up around an opening which has been made. These granulations sometimes require reduction by the use of silver nitrate solution.

**CASE VIII. CHRONIC EMPYEMA OF THE MAXILLARY SINUS;
OPERATION SEVERE HEMORRHAGE, PACKING SYSTEMIC IN
FECTION AND THROMBOSIS**

This case was that of a man aged forty who consulted me in September, 1917, complaining of symptoms of general muscular rheumatism which had been annoying him for a couple of years. He had had the tonsils removed a year and a half before and at the same time had an infected upper wisdom tooth on the right side removed. This extraction had been followed by acute symptoms over the right maxillary sinus with a profuse purulent discharge from the nose. These symptoms of sinus disturbance have never entirely disappeared.

On examining him I found that there was a deep shadow over the right maxillary sinus but the other sinuses remained clear. The sinus was punctured through the middle meatus and irrigated. The characteristic foul smelling discharge usually found in chronic maxillary sinus empyema was washed out. Because of the chronic nature of his trouble and the fact that he was suffering from symptoms of a systemic infection for which no other active focus was discovered it was decided to operate upon the right maxillary sinus. The operation was performed under local anesthesia the middle turbinal body was removed and an opening made in the middle meatus. It is important to make the opening large enough to provide free ventilation of the sinus. In order to cure a chronic case such an opening must be $\frac{1}{2}$ to $\frac{3}{4}$ inch long and from $\frac{1}{2}$ to $\frac{1}{2}$ inch broad. In such an opening there is no danger of spontaneous closing and the only cases of chronic empyema which do not appear to recover completely after such an operation are the exceptional cases where there is some necrosis of the bone. One must be careful in operating not to cut too far forward because there would be risk of injuring the tear duct. In this case while making an effort to enlarge the opening posteriorly a rather large artery was injured and a very profuse hemorrhage resulted. A strip of gauze was quickly packed in the nose but this did not suffice and a second effort had to be made in a few moments because of the persistent profuse hemorrhage. Thus gauze was tamped

very firmly upward and backward toward the sphenoid. Because of the profuse hemorrhage we did not risk removing the tampon completely the next day, but only loosened it partially. The following day the entire remaining strip of gauze was removed. The patient was quite weak from the loss of blood developed a temperature of 102° F., and for these reasons was kept in the hospital for eight days. No subsequent hemorrhage occurred while in the hospital. At the end of eight days the patient was allowed to go home, though he was still feeling quite weak. The second day after his return while sitting at the breakfast table, he experienced a sudden profuse hemorrhage from the nose, which stopped in the course of twenty minutes spontaneously. A physician did not reach him for a couple of hours. In the meantime he had experienced another profuse hemorrhage. The nose was packed again, which was removed in twelve hours. Shortly after this he developed a chill and a temperature ranging as high as 106° F., and for a few days ran the typical septic temperature with chills characteristic of thrombosis. At the same time a swelling in the calf of the right leg developed. This formed into an abscess which later had to be opened. The patient eventually made a complete recovery. I saw him the latter part of February 1918. The opening of the maxillary sinus was still present. There was no discharge from the nose and irrigation of the sinus showed the cavity to be clear from disease.

The packing of the nose after an operation for suppurating sinus is to be avoided wherever possible. In a case of this sort, where the hemorrhage was very severe, packing cannot be avoided. The ulceration of the nose which followed the pressure of the gauze was very likely responsible for the secondary hemorrhage, as well as for the septic infection and thrombosis.

CASE IX. FRONTAL SINUS INFECTION

The patient is a woman of sixty two who consulted me October, 1917, complaining of headaches which came on daily and had been bothering her for six weeks. The pain was located definitely over the region of the left frontal sinus. The

onset of the trouble had not been preceded by the symptoms of a head cold, which usually precede an acute sinus trouble. In an examination of the nose I failed to discover the slightest change in the membranes about the opening of the nasofrontal duct which would suggest frontal sinus infection. The patient had none of the nasal symptoms which usually go with sinus trouble, such as increased unilateral nasal discharge and those symptoms which are associated with congestion of the membranes of the nose, chiefly the symptom of nasal obstruction. The opening of the frontal sinus into the nose is under the middle turbinate body. In this case the middle turbinate body was small, and we had little difficulty in inspecting the middle meatus, that is, the space between the free edge of the middle turbinal body and the outer nasal wall. It is so unusual to find persistence of a frontal sinus trouble without local evidences in the membrane lining the middle meatus that I was at first inclined to suspect a neuralgia of the supra orbital nerve rather than a true accessory sinus trouble. The region of the left frontal sinus was distinctly sensitive to pressure—a condition which would be found as much in a case of frontal neuralgia as it would in a case of frontal sinus infection. In making a transillumination test of the nasal sinuses the maxillary sinuses were shown to be quite clear and the right frontal sinus was quite clear, while in the region of the left frontal sinus there was a distinct shadow. The transillumination test for accessory sinus trouble has its limitations. These limitations are more clearly defined in the case of the frontal sinus than in that of the maxillary. In most of the cases where there is no maxillary sinus infection the transillumination gives us definite information as accurate as does the skiagraph. Wherever the light shines through clearly and equally as it does in most cases of normal maxillary sinuses there can be no doubt regarding the condition of these cavities, and a skiagraph adds nothing of value in making the diagnosis. It is only in cases where the transillumination throws a shadow on one or both sides that we are left in doubt. Such a shadow frequently is due to very much thickened bony structures, and not to any pathologic conditions.

in the sinus. In these cases the skiagraph is of assistance as the x ray will show very definitely when the sinuses are filled up with pathologic conditions. In the case of the frontal sinus transillumination leaves us more frequently in doubt, due chiefly to the frequent occurrence of anatomic variations in the size of this sinus. After all however in most of the cases where there is no frontal sinus trouble the transillumination gives us an entirely satisfactory answer. Where both sides light up clearly and equally there can be scarcely a doubt regarding the existence of normal conditions. The failure of the frontal sinus region to light up on transillumination may be due to a pathologic condition in a sinus but it may also be due to either a small frontal sinus with thick bony walls or complete absence of a frontal sinus. The latter condition is by no means uncommon. In the case under discussion the transillumination showed a distinct shadow on the left side which was not present on the right and it is in just such cases as this that the skiagraph is of great assistance. The skiagraph shows at once the size of the sinuses and what is more a well made skiagraph will give very accurate information as to whether the sinuses are normal or whether they are the seat of pathologic changes. In this case the left frontal sinus was found to be a well-developed sinus fully as large as the one on the right. A distinct shadow in the skiagraph over the left frontal sinus showed that the sinus was filled with some pathologic condition. Because of the age of the patient and she being rather frail I was very anxious to avoid any operative procedures. I tried to relieve the retention of secretion in the frontal sinus by applications of $\frac{1}{2}$ per cent. cocaine made up in 1:5000 adrenalin to the membranes lining the middle meatus. This was repeated on four different occasions during the month of November but at no time did I succeed either in securing drainage from the frontal sinus or in relieving the discomfort. The patient found that by taking 10 to 15 grains of aspirin the discomfort was made very much more bearable but by December 1st she had reached the conclusion that she would prefer to have me attempt to relieve the condition by an intranasal operation. This operation I under-

took under local anesthesia. The anterior half of the middle turbinated body was removed, and the anterior ethmoid cells cleaned out, so as to give us freer access to enlarge the naso-frontal duct (Fig. 215). I had never been able in this case to introduce a probe into the frontal sinus, but after the removal of

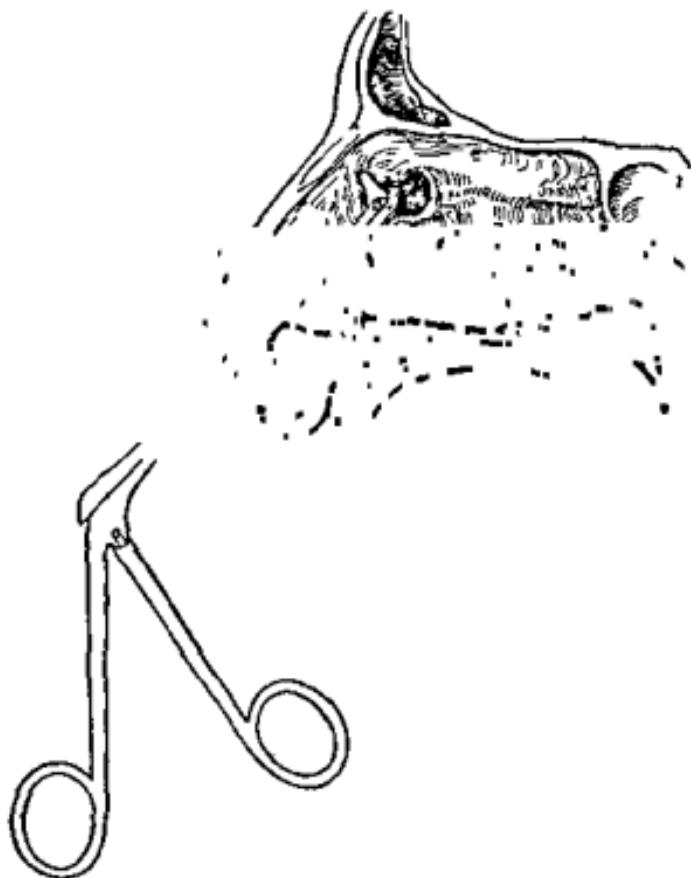


Fig. 215.—Lateral wall of the nose. Anterior part of middle turbinated body removed. Bone forceps in position, removing anterior ethmoid cells in order to secure better drainage from frontal sinus.

the anterior part of the middle turbinal body and exenteration of the anterior ethmoid cells I found no difficulty in introducing a probe into the sinus. With a frontal sinus rasp this opening was made larger. Because of the bleeding I was unable to detect any evidence of discharge from the frontal sinus. The

operation had to be done very quickly, as the patient was not strong. After the operation there seemed to be very little immediate relief in the discomfort in the region of the frontal sinus. No effort was made to treat the case for some time—in fact, not until the reactions following the operation had completely subsided. Four weeks after the operation I introduced for the first time a cannula into the frontal sinus and washed out a quantity of thick gluey pus. The relief which followed this procedure was very distinct. I saw the patient again two weeks later. The symptoms of soreness over the frontal sinus had practically disappeared. The sinus was irrigated, but no secretion washed out. The shadow on transillumination was still quite distinct. This shadow was due to the thickening of the membrane lining the sinus. The patient was seen March 1, 1918. She was quite free from symptoms. A probe could be readily passed into the frontal sinus and transillumination disclosed no trace of a shadow.

CASE X. CHRONIC ABSCESS IN THE TONSIL FOSSA FOLLOWING OPERATION FOR ENUCLEATION OF THE TONSILS

This case is that of a woman aged forty-five who gave a history of long-standing tonsil trouble consisting of recurring attacks of acute tonsillitis and annoyance from accumulation of cheesy plugs in the tonsil crypts. Patient had never had quinsy or sore throat. The last attack of acute tonsillitis was seven years ago. Patient has had symptoms of general muscular rheumatism characterized by soreness and stiffness of muscles, especially about the shoulders and arms since she was twenty years of age. For two or three years has had a distinct arthritis in the right knee, and for the past year has been developing an arthritis in the terminal joints of both little fingers. The terminal joints of all the fingers are somewhat tender and stiff, but only the little fingers show any distinct swelling.

Because of these general symptoms and the conditions found in the tonsils the patient had had an operation for enucleation of the tonsils under local anesthesia October, 1917. Two weeks after the operation the throat appeared to be entirely healed.

About that time she began to notice a swelling in the fossa of the left tonsil. This swelling enlarged to about the size of a hazelnut when it ruptured spontaneously and discharged pus. The condition has persisted ever since although several efforts have been made to correct it. The swelling has been freely incised and the cavity curedt.

Iodin has been also injected into the abscess cavity. When the patient was seen by me the first of last October in the fossa of the left tonsil at the junction of the middle and upper thirds was a swelling about $\frac{1}{2}$ inch in diameter showing only a moderate elevation. The region about this swelling was distinctly congested and by pressure pus was expressed through a small fistulous opening. The patient states that she experiences acute exacerbations of this trouble when there is marked soreness in the throat and distinct increase in the purulent discharge. In discussing the situation with the doctor who had removed her tonsils and who had taken care of the throat subsequently he was under the impression that the trouble lay outside of the tonsil perhaps from a lymphatic gland which had become infected. It was apparent that the correction of the difficulty meant a careful dissection which would remove the walls of the abscess cavity. This was accomplished under local anesthesia. A probe provided with hooks at the point was introduced into the opening and the diseased tissue pulled out into the pharynx. The diseased mass was then dissected out. It was found to consist of a small mass of tonsil tissue which had become enmeshed in the scar tissue after the first operation. This complication one meets with occasionally after the tonsils have been apparently successfully enucleated. At one point or another a fragment of lymphoid tissue has been overlooked and when such fragments are left they are very prone to become the seat of a persisting infection and especially likely to cause systemic trouble. In this case the rheumatic symptoms improved very markedly a month after the operation. Persistent infection in the pharynx after removal of the faucial tonsil is more often found at the lower pole where the faucial tonsil joins the lingual tonsil. In this region there is no sharply defined demar-

cation between the faecal tonsil and the lingual tonsil and for this reason it not infrequently happens that lymphoid tissue at the base of the tongue grows up and occupies the region formerly occupied by the lower half of the faecal tonsil. Fragments of tonsil tissue left in this region may become the seat of a persisting infection capable of causing systemic trouble. For these reasons we take pains to remove as much of the lymphoid tissue as is feasible at the lower part of the tonsil at the time the tonsils are enucleated. In spite of this precaution cases occasionally present themselves where a focus of infection persists in this region.

CASE XL. SINGER NODULE ON THE VOCAL CORD

Mr J M T., age forty four, consulted me in February, 1917, complaining of hoarseness, which had been annoying him more



Fig. 216.—A view of the larynx showing the nodule on the left vocal cord.

or less for several years and which always became more troublesome after using his voice. He was not a professional singer, but did a great deal of public speaking, and for this reason suffered a good deal of inconvenience from the handicap caused by his hoarseness. There were no other throat symptoms. He was not subject to tonsillitis. He has been a victim of hay fever for a number of years. At the time I saw him first he was suffering from an acute head cold complicated by an acute

infection in the right maxillary sinus. Aside from this the conditions in the nose and pharynx appeared normal.

In the larynx both vocal cords showed a slight congestion. On the left cord there was located a soft nodule quite distinctly circumscribed and measuring 2 mm. in diameter. This nodule took its origin from the mesial aspect of the cord at about the junction of the middle with the anterior third (Fig. 216).

The inspection of this part of the larynx by means of the laryngoscopic mirror was rather difficult owing to the fact that a rather short frenum of the tongue made it difficult to pull the tongue out forcibly enough to draw the epiglottis forward. After cocaineizing the throat with 5 per cent solution of cocaine swabbed on the surface of the soft palate and the posterior wall of the pharynx I succeeded by the indirect method in removing the nodule with a laryngeal forceps devised for this purpose. The patient was given directions to be very cautious about the use of the voice for ten days.

When the patient was seen a couple of months after the operation the left cord was still slightly thickened and more congested than the right, but the difficulty with the hoarseness had in a large measure disappeared.

CASE XII. CARCINOMA DEVELOPING ON THE TRUE VOCAL CORD

Mr H G D age thirty four consulted me in March 1917. His sole complaint was that of hoarseness which began to develop the previous October. It came on insidiously and gradually became more marked until six weeks ago when without any recognized cause the hoarseness became very much worse. It was not associated with any local discomfort. He had never been troubled with cough and his general health did not seem to be impaired. The man looked robust and in good health.

In making an examination of the respiratory passages the nasal passages on both sides were somewhat constricted as the result of anatomic variation. The faecal tonsils were somewhat enlarged and showed distinct evidences of chronic infection consisting of congestion and large cheesy plugs in the crypts. The patient gave a history of recurring attacks of acute

tonsillitis. The postnasal space was normal. Both vocal cords were moderately congested. On the left vocal cord, at the junction of the middle with the posterior third, was a rather circumscribed infiltration, the posterior margin of which was sharply defined. The posterior third of the cord was normal in appearance. The infiltration extended anteriorly, gradually diminishing until it reached the anterior commissure. The surface of the infiltration was roughened and showed distinct ulceration and was covered with yellowish secretion. The movement of the vocal cord was not interfered with. The appearance of the lesion suggested rather a tuberculous process. Careful examination of the chest by an internist discovered nothing very characteristic of a tuberculous lesion. There was no expectoration of mucus, so that an examination for tubercle bacilli could not be made. A Wassermann test was negative. The patient was advised not to use the voice above a whisper and to report back for observation. A general regime was adopted as though he were suffering from incipient tuberculosis. Under this treatment the patient gained in weight, but the local condition in the larynx became more troublesome.

During my absence from the city in August the patient was under the care of Dr. Boot. At that time there was decided increase in the infiltration in the larynx, and a small section of the tumor was removed and a histologic examination made by Dr. A. M. Moody, who diagnosed the condition as carcinoma.

I saw the patient again the first week in September. The infiltration had become much more extensive and was causing some difficulty in respiration. The opposite vocal cord appeared unaffected and there was no glandular involvement of the neck. The situation with the histologic findings was placed before Dr. Arthur Dean Bevan, who removed the left half of the larynx. Examination of the tissue removed proved beyond any question the existence of a carcinoma. The patient was seen last on November 1st. He was feeling well and had completely recovered from the operation. His voice is about as it was before the left half of the larynx was excised.

It is, of course, too early to determine whether there will

be a recurrence. Carcinoma of the larynx extends very late to the neighboring lymphatics and for this reason removal of the affected part offers a better prognosis than in cases of carcinoma in most regions.

CASE XIII. CYSTIC FIBROMA OF THE NASOPHARYNX

Boy age fourteen whose complaint was nasal obstruction which had annoyed him only during the past year. Was seen by me May 1 1917.

Examination of the nose disclosed conditions which might very easily be a factor in causing nasal obstruction as the septum had a pronounced ridge projecting toward the left. The fact that his annoyance came on only during the past year suggested at once some other cause since there was no history of trauma which might account for the recent development of the deflected septum. Deflection of the nasal septum and spurs of the septum are very common occurrences. One might almost say that it is exceptional to examine a nose where there does not exist some irregularity of the nasal septum. An irregularity of the septum which requires correction surgically is however very unusual. A great deal of undue importance has been given to the irregularities of the septum both as a cause for nasal catarrh and as a cause for ear trouble. A safe rule to follow in deciding whether a deflected septum needs correction is to find out whether the patient is annoyed by symptoms of nasal obstruction which cannot be accounted for in other ways. In this case an examination of the postnasal space disclosed the real cause for the symptoms of nasal obstruction. The mucous membrane of the posterior wall of the pharynx was found to be covered with a thick tenacious mucus and by means of a postnasal mirror the postnasal space was found to be occupied by a round mass the size of a hickory nut the surface of which had a distinct grayish color. The growth was located somewhat more toward the left. The rounded appearance of the growth and the color excluded the probability of a sarcomatous growth. It was clearly not a mucous polyp and a diagnosis of postnasal fibroma was made.

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It is of course too early to determine whether there will

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There are various ways of extracting these postnasal growths. One is by introducing a snare through the nose. In this case the growth was removed through the mouth. It was necessary to cocaineize the soft palate and posterior wall of the pharynx. A retractor for the soft palate was then placed in position. The growth was readily seized with the postnasal forceps and dragged from its attachment. It proved to be a cystic fibroma.

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